MODEL AIRPLANE NEWS

JULY

1932.

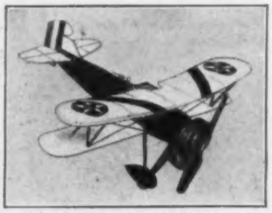
15¢

"A COURSE IN AVIATION FOR FIFTEEN CENTS A MONTH!"

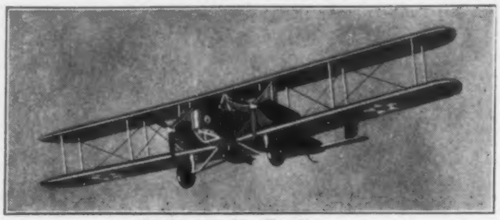
BRITISH HAWKER FURIES. Description and Plans Page 11

National's Latest Presentations

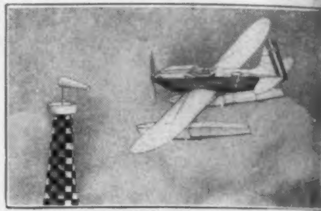
The Five Models illustrated below are in response to the greatest number of requests received. Each illustration is made from an actual model built from National construction kit.—Each kit designed for easy construction, with complete details and excellent flying ability.



Midget Curtiss Hell-Diver
Wingspread 12". Colors—White and Blue. Complete Kit $1.00



Curtiss Condor Bomber
Wingspread 18". Colors—Yellow and Green. Complete Construction Kit $1.50



British Supermarine
Wingspread 18". Colors—White and Blue. Complete Kit $1.50
Pylon Built from Balsa and National Checkered Tissue

Midget Bellanca Air Bus
Wingspread 12". Colors—Green and Yellow. Complete Kit $1.00

Midget Fokker D-8
Wingspread 12". Red Covering, Iron Crosses. Complete Kit $1.00

FREE!

NATIONAL'S MONTHLY BULLETIN Supplements the General catalogue. It's chuck full of news to model builders. Describes and illustrates the latest models,—and construction kits ready for you to build. Quality Supplies,—at new low prices and special monthly offerings. Write for your copy today. Free on request.

ATTENTION!
New Catalog "E" contains all late information, lists 17 2-ft. models, 24 Midget models, 4-18" models, and 4 Beginners models. NATIONAL'S list of quality supplies at new low prices. Catalogue and Bulletin 5c. Send for yours today.

NATIONAL'S CONSTRUCTION KITS—Always Complete—Highest Quality AT VERY LOW PRICES

ALL 12" MIDGET KITS $1.00 — 18" JUNIOR KITS $1.50 — 24" SENIOR KITS $2.00

NATIONAL now offers you 50 Flying Scale models in three sizes. Each model complete with genuine Blueprints, fully detailed and supplemented with instructions. All necessary materials of best quality. Exclusive features are: Colored Tissue,—correctly designed insignias in colors, formed wire parts. Easy assembled propeller—many wood parts stamped out and all strips cut to exact dimension. Don't let a few pennies in price keep you from buying a quality construction kit. A cheap kit with minimum material and of cheaper quality is bound to bring only disappointment.

MIDGET MODELS

12" Wingspread. $1.00 Each.

Curtiss Hawk	Fokker Triplane	Pfalz Scout
Heath Parasol	Nieuport Scout	Sopwith Camel
Fokker D-7	Boeing P-12	Gee-Bee Sportster
British S. E. 5	Texaco-13	Laird-400
Curtiss Robin	Sikorsky S-38	Polish P-6
Curtiss Falcon	Bellanca	Curtiss Hell-Diver
S. P. A. D.	Lockheed Vega	Fokker D-8
Albatross	Lockheed Sirius	Bellanca Air Bus

Any Midget Blueprint 25c
Any Midget Model Ready to Fly........ $4.40

JUNIOR MODELS

18" wingspread
$1.50 each

Curtiss Bondor Bomber
Supermarine S.&B.
Army Boeing P-12
Navy Boeing P-12

Any Junior Blueprint 35c
Any Finished Model Ready to Fly $7.50

SENIOR MODELS

24" Wingspread. $2.00 Each.

Curtiss Army Hawk	Fokker Triplane	Stinson Detroiter
S. P. A. D.	Albatross	Lockheed Sirius
British S. E. 5.	Boeing P-12	Heath Parasol
Nieuport Scout	Vought Corsair	Gee-Bee Sportster
Fokker D-7	Texaco-13	Laird-400

Any Senior Blueprint 50c
Any 24" Model Ready to Fly............ $12.00

SOME OF NATIONAL'S QUALITY SUPPLIES AT NEW LOW PRICES

Balsa Strips
1/16 sq. x 36" 8 for $.05
1/16x1/8x36" .6 for .05
1/8 sq. x 36" 6 for .05

Balsa Sheets
1/32x1x35" ......ea. .02
1/32x2x36" ......ea. .04
1/16x2x36" ......ea. .08
1/16x3x36" ......ea. .12
1/8 x2x36" ......ea. .12

Japanese Tissue
White 20x24...2 for $.05
Colored: Yellow, Orange, Red, Olive, Green, Blue and Black, 20 x 24
Each .... $.05

Cement Full Strength
½ oz. .... .08
1 oz. .... .15
2 oz. .... .25

Banana Oil Full Strength
½ oz. .... .07
1 oz. .... .12
2 oz. 18

Celluloid Wheels
¾" dia. ..per pair $.06
1" dia. ..per pair .08
1⅜" dia. ..per pair .12
1⅞" dia. ..per pair .20

Celluloid Motors
1½" dia. .... .20
2" dia. .... .25
3" dia. .... .35

Celluloid Pants
With wheels for Midget Models.
Per pair .... $.35

Army Air Colored Insignias
18 different designs.
Per sheet .... $.10

Camouflaged Tissue
7x12 .....per sheet $.10
Checkered tissue
7x12 .per sheet .05
Colors: Yellow, Orange, Red, Green Blue and Black on White, Black on Red, or Black on Orange.

In response to the requests of many model enthusiasts, NATIONAL engineers have designed Solid Scale Models, of three famous racing planes. The following Solid Scale models of the Gee-Bee, Laird and Texaco are now available in a Kit known as:—NATIONAL Trip Kit No. 1—containing drawings, balsa wood, cement, insignias, 4 cans of Lacquer stamped aluminum propellers, wheels and all other parts in more than sufficient quantity to build all three models. Wing spreads as follows:—Gee-Bee—5⅜, Laird 5¼, Texaco 7⅛. Examine carefully the below illustration showing all parts contained in NATIONAL'S Trip Kit No. 1. And also the pictures of the three models as built from this Kit.

ORDER A NATIONAL Trip Kit No. 1 Today. Only $1.00.

HOW TO ORDER

Write or print plainly full name and address.
For packing and postage add 15c to cost of merchandise on all orders up to $1.50 —over $1.50 add 10%. Remit by P. O. or Express Money order, or Check.
We insure all shipments without cost to you.

AGENTS WANTED

We want one dealer or agent in every town to handle National Model Airplane Sets and Supplies. Because of their proven quality, a National model dealer with sets and parts to supply immediate wants can make big money. Write for full details.

Name ....

Address ....

National Model Aircraft & Supply Co.

299 North Avenue, Dept. A-26
New Rochelle, N. Y.

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1.50
Tissue

ity

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$.10

.05

and
Black

and

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to

.26

A Page Full Of The Best Values Money Can Buy

"Benco" Balsa Wood

Our Balsa Wood is the lightest and best balsa to be had. It is clear straight grained stock cut to convenient sizes.

36" Strips

1/16 x 1/16	.01	7 for	.05
1/16 x 1/8	.01	7 for	.05
1/16 x 1/4	.01	6 for	.05
1/8 x 1/8	.01	6 for	.05
1/8 x 3/16	.01½	6 for	.08
1/8 x 1/4	.02	5 for	.09
1/8 x 3/8	.02	5 for	.09
3/16 x 3/16	.02	5 for	.09
3/16 x 1/4	.02	5 for	.09
1/4 x 1/4	.03	5 for	.12
1/4 x 3/8	.03	5 for	.12
1/4 x 1/2	.04	5 for	.18
3/8 x 3/8	.05	5 for	.22
3/8 x 1/2	.06	5 for	.25
1/2 x 1/2	.08	5 for	.35
1 x 1	.17	2 for	.30

40" Strips

1/8 x 3/8	.04
1/8 x 1/2	.04
3/16 x 3/8	.04
3/16 x 1/2	.05

Sheet Balsa

1/32 x 2 x 36	.04½
1/16 x 2 x 36	.05½
1/8 x 2 x 36	.06½
3/16 x 2 x 36	.09
1/4 x 2 x 26	.11

Plank Balsa

1 x 3 x 36	.33
1 x 6 x 36	.60
2 x 3 x 26	.60
2 x 6 x 36	.90
2 x 5 x 40	.90

Balsa Propeller Blocks

1/2 x 3/4 x 5	3 for	.04
1/2 x 3/4 x 6	3 for	.05
5/8 x 1 x 7	2 for	.05
5/8 x 1 x 8	2 for	.05
3/4 x 1 1/8 x 8	2 for	.07
3/4 x 1 1/8 x 10	2 for	.09
3/4 x 1 1/8 x 11		.06
7/8 x 1 1/2 x 11		.07
5/8 x 1 1/4 x 12		.07
7/8 x 1 1/2 x 12		.08
7/8 x 1 1/2 x 14		.10

Dowels

Straight-grained genuine birch dowels in the following sizes:

1/8 diam.—18 in. long	6 for	.05
3/16 diam.—36 in. long	3 for	.05
1/4 diam.—36 in. long	2 for	.06

ABSOLUTELY FREE A BEAUTIFUL Glider Kit

Everything to Complete a Real Model Glider With a Purchase of $1 or More.

Bamboo

TONKIN straight-grained, no-knot bamboo in the following sizes:

1/16 x 1/4 x 15	.01
Per doz.	.08
1/32 x 1/4 x 8	.00½
Per doz.	.04
1/16 x 1/16 x 9—doz.	.03

"Alco" Colorless Cement

Absolutely the strongest, lightest and fastest drying colorless cement on the market! Try some Now!

2 dram tube	.05
1 oz. tube	.13
2 oz. can	.17
4 oz. can	.32
Pint	1.00

Madison "Ace" Rubber

Delivers more turns to the foot. Four sizes to select from at the lowest prices in America!

.045 square	3 ft. for	.01
3/32 flat	? ft. for	.01
1/8 flat	3 ft. for	.01
3/16 flat	2 ft. for	.01

Celluloid Wheels

3/4 diam.—Pair	.06
1 diam.—Pair	.08
1 3/8 diam.—Pair	.11
1 7/8 diam.—Pair	.17
Bushings 4 for	.02

Dummy Radial Engines

Celluloid, 9 cylinders, 3 in. diam. Each .20

Music Wire

Strong, light and stiff. Sizes: .014, .020, .028, .034. 5 ft. packages .02

Aluminum Tubing

1/8 Outside diam. per ft.	.07
3/16 Outside diam. per ft.	.11
1/4 Outside diam. per ft.	.13

Sheet Aluminum

12 inches wide

.005 per ft.	.12
.010 per ft.	.19

Thrust Bearings

Strong and light. Large size	.02
.035 hole. Each	.02
Per Doz.	.20
Small size, .025 hole. Each	.02
Per Doz.	.20

READ BEFORE ORDERING

In Order for Prompt Delivery Please Comply With Instructions Below

1. Orders under 25c not accepted—due to our very low prices.
2. Add 15c for packing and postage on orders up to $1.50; on orders for $1.51 and over add 10% for packing and postage charges.
3. Add 10c extra to above charges on Balsa plank orders less than $1.50 West of the Mississippi and Canada.
4. Postage stamps, Canadian or Foreign Coin not accepted as payment.
5. Remit by check, postal or express money order. Make payment to MADISON MODEL AIRPLANES, INC., 124 Livingston St., Brooklyn, N. Y.
6. Add 5c for insurance against breakage in transit.

Canadian Charges—Add 25c for packing and postage on orders up to $1.50. On orders of $1.50 and over add 15% packing and postage. Postage stamps, Canadian or foreign coin not accepted as payment.

Dealers and Clubs Write for Special Price List

Washers

1/8 O. D. Brass for light indoor models. Per Doz.	.01½
1/4 O. D. Copper for outdoor models Per Doz.	.01½

Covering Material

Newest thing in covering your models!

Aluminum Leaf

This material is pure sheet aluminum .0003' of an inch in thickness. Think of it, only one-tenth the thickness of writing paper. It is light, strong and makes a beautiful covering job. 3½ inches wide ...... 5 ft. for .05

Xtra-Thin Tissue

Absolutely the lightest covering material known to be had anywhere at any price. Use it for covering your endurance models.

Sheet 20 x 15	.05
Doz.	.50

Japanese Tissue. A strong, light tissue for covering your commercial models.

Sheet 20 x 24 2 for	.05
Doz.	.25

Colored Jap Tissue

Colored Jap Tissue, Red, Blue, Orange, Brown. Sheet .07

Per Doz. .75

Wood veneer paper for scale model work.

Sheet 20 x 30 .15

Clear Dope

This is real nitrate dope thinned down to meet the requirements of model airplane usage.

2 oz. can	.13
4 oz. can	.25
Pint	.90

Colored Dope

Real pigmented aircraft dope. Do not confuse this with dopes of inferior quality. Red, Blue, Yellow, Orange, Black, Olive Drab, and Silver. Order by color. 2 oz. can .13

4 oz. can	.25
Pint	.90

Acetone

To thin out your heavier liquids.

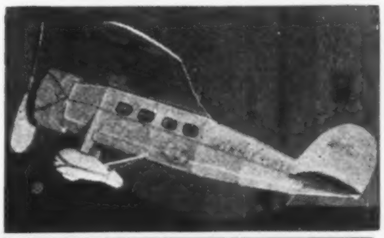
2 oz. can	.11
4 oz. can	.20
Pint	.80

• TWO-IN-ONE KIT •

Contains the around-the-world "Winnie Mae" and the "Trans-Atlantic Bellanca." Both 15" wing spans. Kit contains full size plans, bulkheads, large tube of cement and all other materials needed to complete these two wonderful models. Get yours now.

$1.25

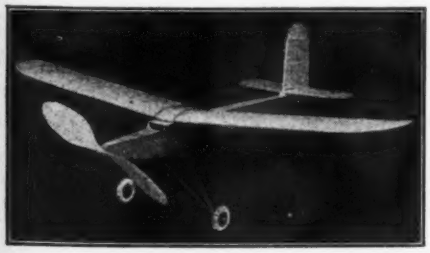
Postpaid



Outdoor Cabin Tractor

A twin pusher that has actually flown 12 minutes not once—but several times! This plane has several features which cannot be found elsewhere. It has a 40 inch "A" frame that is a marvel for lightness and strength, a 36 inch, high cambered, tapered wing, and two 12 inch, high pitch props powered by 68 feet of ¼ flat rubber. The kit contains complete plans and instructions, stamped ribs, and all other materials needed for the construction of the model, Price **$1.50**

Add 10c for Postage



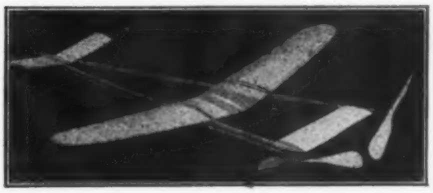
ALUMINUM N. A. C. A. COWLING AND THRUST BEARING WITH DUMMY MOTOR

Size of Cowling: Diameter, 3"—Depth, 2". Packed in cardboard box with mounting instructions. If ordered separately, add 5 cents for packing and postage **50c**

Outdoor Twin Pusher

One of the snappiest flying models in its class, proper engineering and all balsa construction does it. This plane has a double surfaced, high lift wing, 30 inch span, all balsa fuselage, extra strong landing gear to withstand the shocks of outdoor flying, and a large, wide bladed propeller to keep it up for long endurance flights. The Kit contains complete plans and instructions, stamped ribs, large tube cement, 1 oz. bottle clear dope, pair celluloid wheels, and all materials needed to complete the model. Price **$1.50**

Add 10c for Postage.



MADISON MODEL AIRPLANES, Inc., 134 Livingston St., Brooklyn, N. Y.

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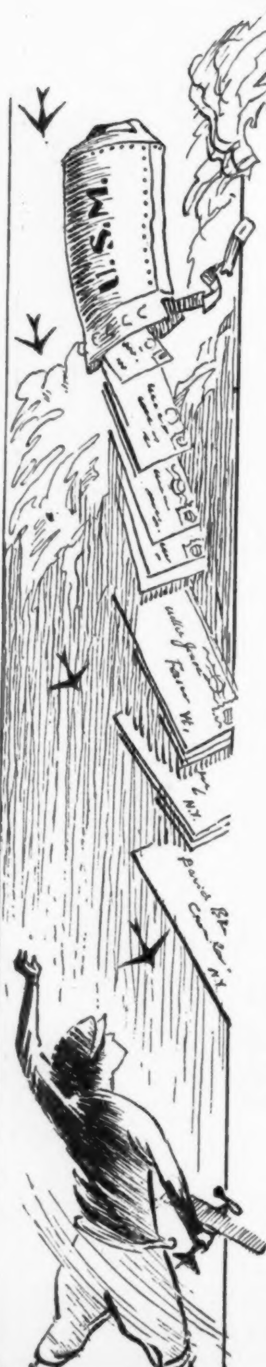
and JUNIOR MECHANICS—Vol. VII No. 1



Edited by ***Charles Hampson Grant***

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In Our Next Issue

Plans for Latest Fighter

Complete plans and instructions to build a solid scale model of Uncle Sam's latest airplane marvel, the Dirigible Fighter F.9 C.2, by Wilson Russ.

Flying Scale Nieuport 28

Many requests have come in to us for plans of the famous World War Nieuport 28, so you will have detailed plans and instructions in the August issue from which you can build a beautiful flying model of this ship.

A very simple and inexpensive Model Aviation feature will provide you with an interesting pastime. Plans and instructions will be given from which you may build a Model Soaring Glider by Robert Loper, whom you will remember as the parent of many fine model ships.

Also, students of aerodynamics cannot afford to miss the AERODYNAMIC DESIGN OF THE MODEL PLANE by Charles H. Grant, and the regular course, WHATS AND WHAT NOTS OF MODEL PLANE BUILDING by Howard McEntee.

Then again, the three view drawings of Modern and World War Planes, as well as another War Ace story by F. Conde Ott, Air-Ways, and other short features, will please your fancy.

In fact, you cannot afford to miss them.

To make sure that you get your copy of Model Airplane News, order it from your newsdealer now, or send your subscription to this office, 570 Seventh Avenue, New York City.

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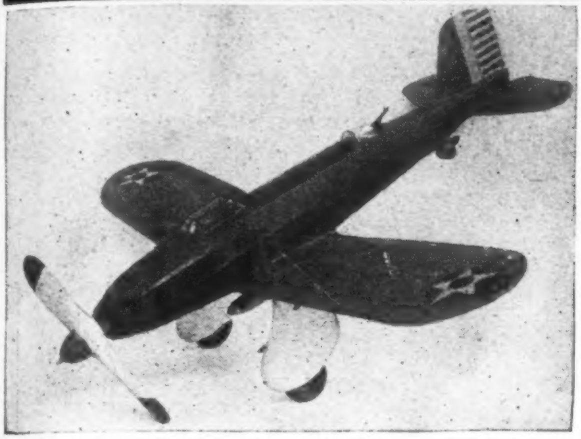
MONTGOMERY MODELED FIGHTING SHIPS of the WORLD



The Only Company Specializing Exclusively in Modeling Small Fast Pursuit and Attacking Military Combat Planes

• • Everyone's Switching to these ... "Here-and-Now" Military Fighters

Some Exclusively Original Montgomery Modeled Features:

"Montgomery Modeled" Ships can be machine wound without tinkering or removing any parts. No motor sticks to be accurately re-inserted in the clips after each flight out in a windy field.

"Montgomery Modeled" Landing Gears, the result of long and painstaking experimentation, under actual flight conditions **are so constructed and fitted with simplified shock absorbing features** as to be able to withstand repeated hard end over end smashes in strong winds!

"Montgomery Modeled" Props are so designed, prepared and finished as to be **practically unbreakable**—and yet they're Balsa! **"Montgomery Modeled" Fuselages have no tiresome bulkheads** to be cut out, with umpteen notches around their edges, and yet **there isn't a flat sided ship in the bunch!**

"Montgomery Modeled" Construction features have been so simplified that all steps in wing and body building are **elementary,** and **possible even to beginners.**

Montgomery Model Dopes, our own formula, have the appearance of Shiny Lacquer Big-Ship Dopes, yet without their excessive weight, and they are exact in color to the Army and Navy specifications.

"Montgomery Modeled" Ships are the **only ships fitted with adjustable stabilizers.**

MODELS YOU WILL SWEAR BY—NOT AT!

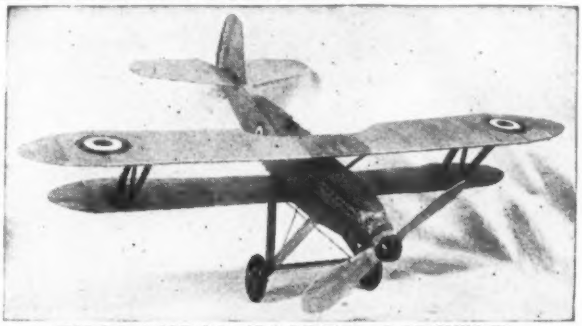
Montgomery Aircraft are modeled only from a **carefully selected line** of small, fast ships that by reason of their **natural streamlining** and consequent absence of excessive drag, together with the **absence of any especially difficult tricky construction,** will offer **Montgomery Builders the least possible amount of difficulty in construction,** and insure him the **best possible flying performance.**

Curtiss Army A-8 Attack

World's Fastest 2-Place Attacking Battle Plane

We jointly led them all to model this one for you,—**a ship to end wars by its terrifying powers of Death and Destruction.** You all know its amazing records and as much about its actual performance as we do, for no real data is available to anyone outside the War Department.

Here's the kind of a ship that gives us a **thrill to model for you** because the marvelous design of the original ship **lends itself so perfectly to our purposes.** We haven't changed her appearance one bit. By the **device of special Montgomery Model Shock Absorbing Features even in the pants** we have eliminated the necessity of cluttering up her naturally clean appearance with struts between the pants, etc., we've broken her back flying in winds to find her weak points, and at last **She's Right,** and we don't mean perhaps. A combination of **speed, upget and glide that will thrill you to your toes.** Finished in Exact Army Colors and Insignias just as you see above. 18" wing span. For **$1.50.**



ENGLAND'S FAIREY FIREFLY

WORLD'S FASTEST SUPER-INTERCEPTOR FIGHTER

We led them all to bring you the first reproduction in this country of the English Super-Interceptor Fighters, with a terminal velocity dive of 400 m.p.h., 220 m.p.h. at 20,000 ft. and 250 m.p.h. at Sea Level, and **that's steppin' out just a few!** With our established policy of giving you only the Fastest and Snappiest Military Fighters, no matter where produced, we had to skip over the Big Pond to bring you this one, and **Man, oh! Man, what a Ship She is.** Crammed full of new "Montgomery Modeled" Features from spinner to stern post, she'll sure thrill you with her **Flashing Speed, beautiful appearance, and wonderful all 'round flying performance.**

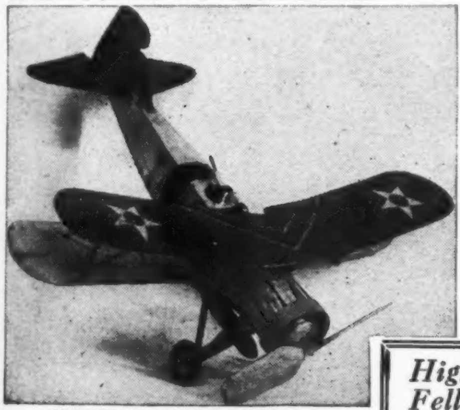
A biplane with only slightly more surface than an **equal sized monoplane!** and no hanging a keg of nails on the nose to get her to perform either! Montgomery Model Design has taken care of that. Finished in the Official Blue and Silver of the Royal Air Force with English Insignia, complete as you see above. Weighs 1⅛ oz., span 18". For $1.50 p.p.

A NEW DEPARTURE

Remit by Money Order or Check.
No extras outside of U. S.
Send 5c for illustrated catalog.

The price of **"Montgomery Modeled" Ships** is made possible only because they are sold through the medium of these pages and **Champ Builder Agents,** who are willing and glad to give you their time and expert advice on completing and flying your **"Montgomery Modeled" Craft, to get maximum performance.**

These **"Montgomery Modeled" Ships** will fly (if half way decently constructed), about **300 feet,** staying in the air about **15 seconds** and if serviced by one of our **agents,** are **absolutely guaranteed** to give **complete satisfaction.**



CURTISS NAVY F8C5 HELL-DIVER

We blazed the way in this one, too! We've been **perfecting** and **improving** this **zippy little "divvil" for over a year now** and we've found out a thing or two about its design. **A marvelously exact Montgomery Modeled duplicate** of the **original Curtiss-Navy Design** that left them all pop eyed in wonder when they saw its performance. If you haven't had a **Montgomery Modeled Hell-Diver, you aint seen nothing yet.** Seriously, fellers, here's **a real thrilling ship complete** as you see above. **Weighs 1⅛ ozs. 18" wing span for $1.50 p.p.**

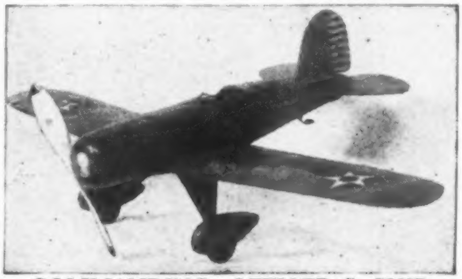
These actual photographs show what **Montgomery Modeled Ships look like,** and are not the results of clever artistic re-touching.

ALL KITS $1.50 POST PAID

18" Wing Span

High School Fellows :-

If you have built models for 2 years or more—if you will help "Lame Duck" Builders to complete and fly their Montgomery Modeled Aircraft, so that you can carry on your experiments FREE, and if you think you can correctly answer a few technical questions, then write for **Champ Builder Service Station Plan.**



COMMANDING OFFICER'S SHIP

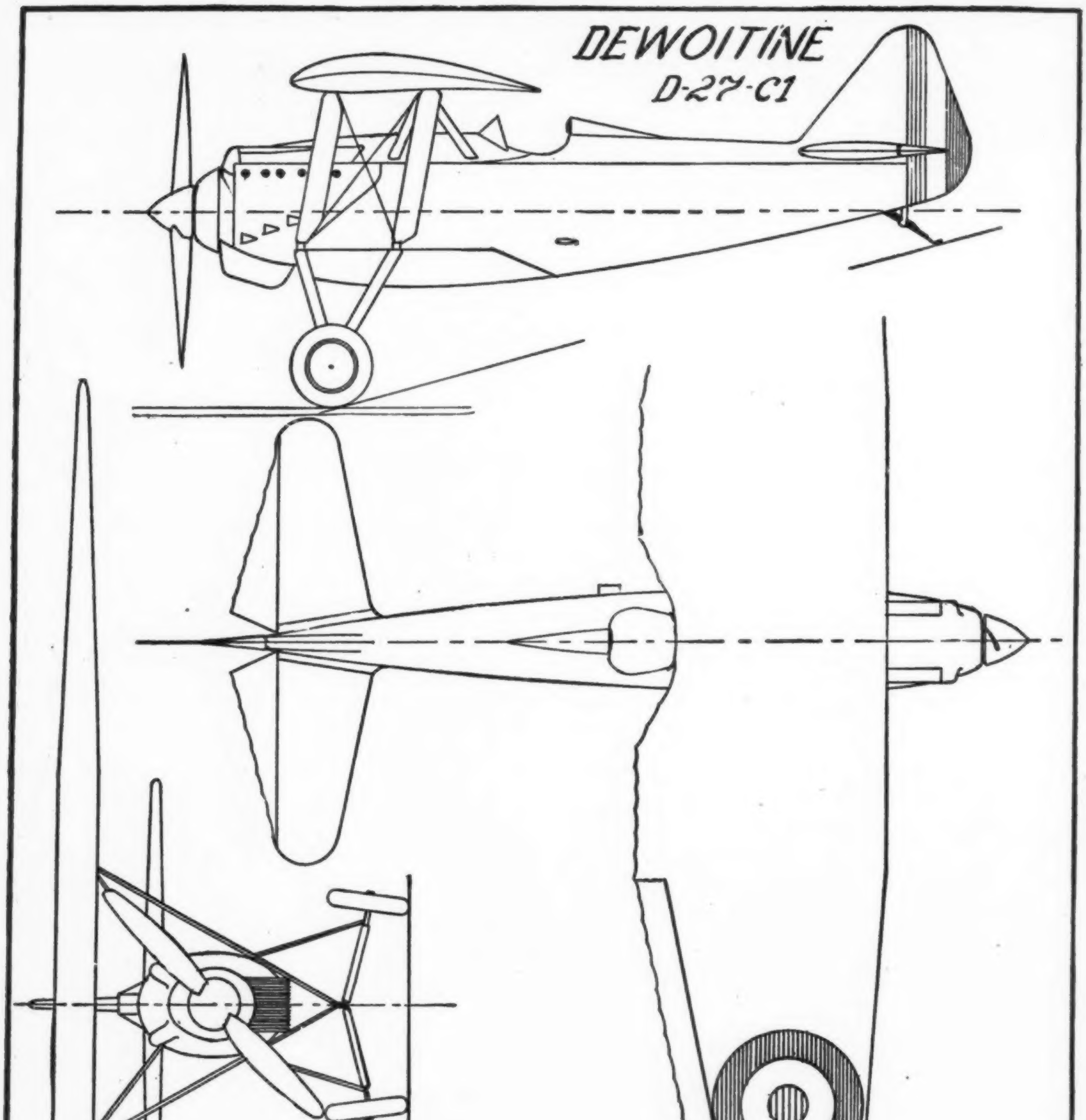
This Lockheed Sirius ship revolutionized American Designing by showing the **remarkable qualities of a low-wing ship,** quickly taken up by **Lindbergh** and other famous flyers it **smashed all existing x-country records,** and was then ordered and specified by both **Army and Navy Departments** for fast transportation of high officials.

The **Montgomery-Modeled Ship,** as you see above, looks **exactly like the original.** Its clean, racy lines, gleaming colored surfaces, from its **shining aluminum N. A. C. A. cowling** to its striped Army tail insignia, will give you the thrill **of your young life,** and **PERFORMANCE**—Man, oh! Man, how this baby steps out and up, and how she can take punishment. Just try this one at the price you'd ordinarily pay for a little midget parlor flyer. Weight 1-3/16 oz. 18" wing span. Complete kit as pictured above, $1.50 p. p.

Montgomery Modeled Aircraft • 732 West Broadway, Woodmere, Long Island

THE WELL KNOWN PURSUIT PLANE DEWOITINE D-27-C1

This is one of the fastest French planes, having a high speed of 192 MPH at sea level, with a 500 HP Hispano-Suiza engine. The landing speed is 55 MPH and the ceiling 30,000 feet. A few points to notice in constructing a model of this machine are the very thick tapered wing, the serrated trailing edges, and the unusual cabane. The fuselage is metal monocoque, and so is prefectly smooth. The fin and rudder are also covered with smooth dural. A good color scheme for the ship would be all silver with black trimmings. The circles on the wings have the blue in the center. On the tail the blue is nearest the rudder post.



A new idea applied to an airplane. A Rotor plane that has been recently invented and completed by Mr. Guest. It will be given flight tests in the near future

Will the Magnus Effect Eliminate Airplane Wings?

Pros and Cons of Secret Experiments that May Soon be Launched in the Open Market

By R. Evans Otis

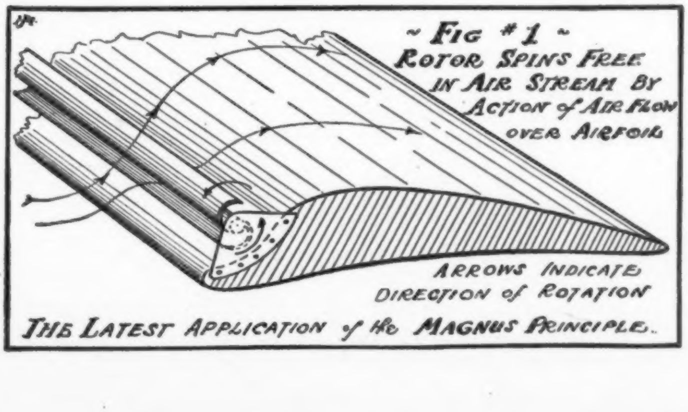
SINCE July 31, 1894, when Hiram Maxim made the first successful flight in a heavier-than-air flying machine, many men have died in making their contributions to the present stability, speed, power, lift, and endurance of the modern airplane. Many men have given their lives, too, in the so-far unsuccessful attempts to produce an airplane that will rise and descend vertically, that will make unnecessary the now essential spacious landing fields that preclude the possibility of commercial airports near the center of any large city.

Unless the secret Curtiss experiments of a year or so ago proved successful—and the secrecy that followed these tests makes it seem unlikely—the helicopter has not yet given any promise of solving this problem. It is a fact that the auto-gyro, an adaptation of the helicopter principle, has produced several varying types of planes that can take off at an angle of approximately forty-five degrees and land at as sharp an angle as eighty degrees; but this achievement, which marks a long march towards the ultimate goal, still falls far short of it.

Less than two years ago, a group of engineers and inventors caused somewhat of a flurry in aviation circles by their announcement that they had completed a *wingless airplane* with which they proposed to demonstrate the practicability of ninety-degree ascent and descent. Students of aeronautics delved deeply into worn and antiquated volumes on physics, for there were few who remembered anything of the *Magnus Effect*, which was said to be the basis of the new plane. The research produced varying opinions: some keen students evidenced a profound interest in the revolutionary experiment; many awaited the first tests with a mild and somewhat aloof curiosity; but the vast majority shook their heads wisely and smiled.

Interest in the new venture was rife, however, until the first—and only—test of that rotor plane proved not only that it could not be raised above the water, but also that it was thoroughly unmanageable on the surface. In view of the many failures that mark the march of progress in any science, this ill-fated experiment should not have sounded the doom of the *Magnus Effect* as a potential factor in the development of airplanes; and, yet, until recently, nothing more has been heard of this century-old principle.

PRIVATE experiments have been continued by many groups apparently, for it is reliably reported that one of the older manufacturers of airplanes is about to announce a new commercial model that embodies the *Magnus Effect*. Study of the principle has produced enthusiasm, if not tangible results, in another quarter, too; for it has been announced that John D. Guest, a West Coast physicist, has recently completed the construction of a wingless airplane in his experimental laboratory on Broadway, and that he is about ready to transport it to a near-by flying field for final adjustments before its first test flight.



The Latest Application of the Magnus Principle.

Before one can speculate on the feasibility of the *Magnus Effect* as an aeronautic principle, it is necessary to look into the history of its application in other fields.

In 1853, Heinrich Gustav Magnus, a distinguished German chemist and physicist, first described his discovery, which has since been universally known as the *Magnus Effect*. (And it may be said in passing that it is fal-

(Continued on page 42)

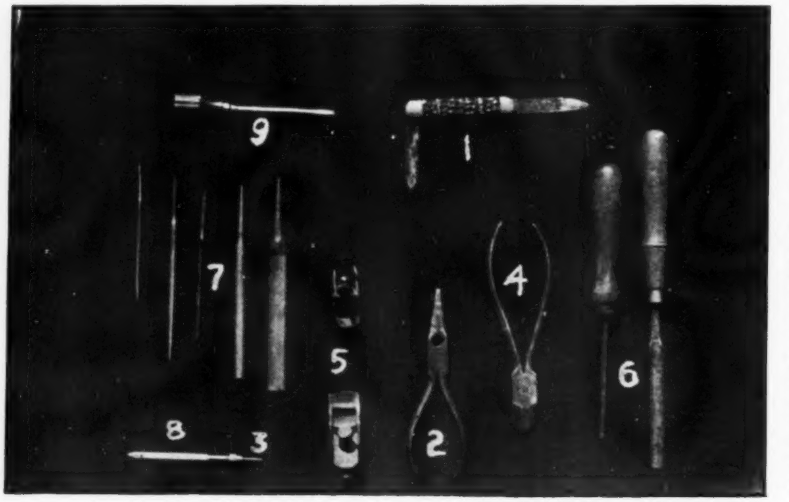
"Whats" and "What Nots" of Model Plane Building

Do You Know ALL You Need to Know About Your Tools and Materials?

By Howard McEntee

THE purpose of this course is to explain the methods of using tools and materials, and to give a good many short cuts which should help beginners and practiced builders alike. No design data will be given, as this subject is being covered quite thoroughly in another series of articles in this magazine. A complete description of the tools and materials needed and their uses will be given, then we will take up the actual building of all types of fuselages, followed by landing gear types, and so on through all the component parts of model airplanes.

Naturally all this material cannot be presented in one article, so the course will be in the form of a series of articles. From time to time a brief outline will be given which will enable the reader to find any particular subject quickly.



Tools required by the Model Plane Builder

Work Bench and Equipment

We shall begin with a discussion of the work bench and its equipment. Of course it is much better to have a place you can call your own to work at, even though it is only a small corner of a room. No one can deny, however, that excellent models can be and have been built on "kitchen table workshops." It is best to have a place where you can leave a partially completed model and not have to move the whole thing to some safe place every time work is stopped temporarily. If you have room to build a good sized table, make it as large as possible. All the extra room can be well utilized for keeping spare wood and other materials. Also, make plenty of shelves for the same purpose. You can arrange one or more shelves in the form of small deep pigeonholes to hold balsa strips. These holes should be about one to two inches square and at least three feet long. Another shelf might be made on which to keep paper, permitting it to lie flat, and need be only an inch or two below the one above. Then you might arrange several shelves to hold cigar boxes in which all small parts such as wheels and propellers may be kept. Blue prints and drawings should always be rolled up, never folded. In this rolled form they are rather bulky and if there are many of them, make a compartment just to hold them so they will be kept safe and clean.

Several drawers are handy to keep tools and various materials in. This is especially true if your shop is in a dusty place.

Lighting

The lighting is an important factor. It is best, if at all possible, to have your bench under a window. If this is not possible or if you work much at night, a good lighting system is indispensable. It is better to have several small bulbs, arranged so that shadows are cut to a minimum, than to have one large bulb. A good light can be made of a rectangular box about two feet long and eight inches on a side with three or more 25 to 40 watt bulbs placed along the bottom. The box is closed on three sides and the inside lined with asbestos paper, obtainable at most hardware stores. Bore one inch holes on the sides and ends for ventilation. The open side is then covered with architect's tracing cloth. This softens the light a little and cuts down the glare. You will appreciate a light of this sort if you do your own drawing work.

Tools Required

We shall now consider the tools needed. Suppose we consider the following as necessary: No. 1, one sharp penknife with large and small blades; No. 2, one pair of long nose pliers with cutters; No. 3, one No. 60 drill with holder; and assorted sizes of sandpaper with a 1"x2"x5" block. To this list an infinite variety of special tools may be added. Here are some of the handiest of these, together with their uses. A pair of so-called diagonal cutting pliers, No. 4, are almost indispensable. Get the very best grade you can because the tough piano wire will quickly ruin a cheap one. A small cabinetmaker's plane, No. 5, is useful for smoothing down small wood and bamboo pieces, and can be had with both flat and rounded bottoms. Both are very handy, but the flat type is used most. The round bottom type is used for cupping propeller blades, smoothing the inside of hollowed out balsa fuselages and such work. For this hollowed-out type of construction, you will need one or more gouge chisels, No. 6. These come in sets for carving work or they can be had singly. The sets are much the best as they have differ-

A unique method of sawing small slots in Balsa sheet by using two slotted metal plates clamped tightly to both sides of the wood

ent sizes and shapes for all types of work. However, almost any work of this sort may be done with a single ⅜" gouge.

Jeweler's files, shown as No. 7, come in many sizes and shapes and can be used for shaping wood as well as metal. They are especially useful for making odd shaped holes in balsa.

A set of metal drills of small sizes, which, of course, can be used just as well on wood, are very handy. Several useful sizes are Nos. 50, 40, 30, etc. They can be bought very reasonably in sets of assorted sizes. A holder for these drills is shown as No. 8.

Such tools as a small screw driver No. 9, small hammer, and saw are handy, but are not used very often. You will find many times that a certain tool will help you on some special job, but is not really necessary. Such tools have not been included in this list, as there are entirely too many of them.

The old standby, the razor blade, is not exactly a tool, but is absolutely indispensable to the model builder. If you use the double edged blades, a layer or two of adhesive tape stuck over one edge will prevent a good many cuts.

Foremost among necessary equipment is a good brass edged ruler. It must be metal edged, as it is to be used as a guide for cutting balsa strips from flat stock with a razor blade. A wooden edge soon becomes useless. It should be twelve or preferably eighteen inches long. Stationery stores usually carry small six inch celluloid rulers, which are very helpful on small work.

Storage battery repair men use bars of lead about one foot in length and three eighths of an inch wide. One of these, cut into two and three-inch lengths, gives you small weights which are very handy for holding pieces on which glue is drying.

A large flat board such as an old drawing board is very good to work on, particularly when building wings and parts which must be pinned to a flat surface while drying. Do not use your table top for this as it will soon become covered with glue, holes and knife cuts.

A good supply of pins, both large and small, is a necessity. These are used mostly for holding glued parts while drying. Bank pins, which have large heads, should be used when making fuselage sides and wings on your board, as they are easier to push in. This point also will be appreciated if you have had to push a couple of dozen ordinary small headed pins into a tough board.

If you wish to work with wire or metal, you will need soldering equipment and metal saws and files, but such work is rarely needed on modern lightweight models.

As mentioned previously, there are many pieces of equipment which may be used for special jobs, but these which have been mentioned are sufficient for most purposes.

Materials Used

The most widely used material in present day models is, of course, balsa wood, which, as you may know, is imported from Central America. It is soft, light, easily worked, and has a distinct grain, but fractures rather easily.

Balsa may be used for any or every part of a model, depending on the particular type it is to be. Balsa comes in a variety of shapes and sizes from 1/16" square and 1/64" flat up to four or more inches square. If you have access to a small buzz saw, you can cut the large boards to any size you wish. Most of us, however, must content ourselves with buying the ready cut pieces. Flat balsa of 1/32", 1/16" and 1/8" thick can be cut perfectly with a razor blade and straight-edge into strips of the desired dimensions. If you use this method, you will not have to keep on hand such a large variety of sizes.

How to Work Balsa

Sandpaper is the best means of working balsa, but care must be used on thin pieces to always sand away from you. If a good deal of material is to be removed, use coarse paper first and finish with finer grades. A wooden block to wrap the paper around and give a hard backing is a help.

Balsa may be planed but the tool used must be very sharp. (See article on page No. 34.) This is true of any tool for cutting balsa. For sawing off large pieces, a hacksaw with fine teeth will do good work. If you wish to turn wheels or any circular pieces of balsa, a lathe is very useful. It is not necessary, though, as any small motor such as an electric fan motor can be used. Simply glue the balsa piece to the shaft and let it dry thoroughly. This drying process is the only disadvantage. When dry, the work may be turned out with nothing more than a knife point and sandpaper. Use the knife point for roughing out and sandpaper for finishing. The piece is best cut off with a

(*Continued on page* 39)

— S.O.S., A CALL FOR HELP! —

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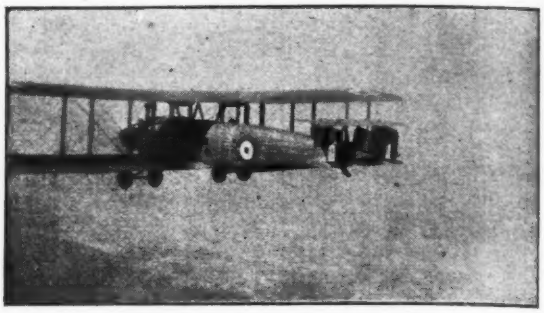
Desert Wings

Thrilling Adventure of the Desert Mail Pilot Who Blazed the Trail on the Baghdad-Cairo Route

By Leslie S. Potter



On our way, 2,000 feet over Egypt

YOUNG Dickie Tompson had been appointed my second pilot. He took his first desert air mail flight with me and it was sufficiently eventful to be remembered by each of us, even today.

We had just finished our usual air test the day before the mail flight, and he and I were walking back from the hangar. "Well, Dick," I questioned, "how does she feel?"

"Fine, Cap," he answered. "You've got her rigged perfectly. Don't you think, though," he added, "we might give her a little more incidence in the tail? Seems a little tail heavy to me."

I smiled to myself. "Ever hear of a rear water tank, Dick? Ever hear anyone say anything about half filling the tank and putting the rest of the water in drums up in the nose? Did anyone ever say anything about distributing the load?"

"Why . . ." he blushed.

"All right, Dick, you'll remember these things when you get a plane of your own."

Four-thirty was the time scheduled for the start, and shortly before this we met again the following morning on the tarmac. It was not yet light and the figures and the planes seemed unreal in the early morning light. The mail weighed around 500 lbs. and there were three passengers in addition to Tompson, a mechanic, a radio operator and myself. It was not a heavy load and I ordered the men to put in another drum of water. One never knew what the desert held in store for those who dared to brave its shriveling heat.

The unreality ended with the springing to life of the motors. We did not do more than warm them up. Air tests had been made the day before, there was no point in getting them overheated before the start, the climate would see to that later in the day.

The Baghdad-Cairo Air Mail Route

Anxious for my second pilot to have all the experience possible, I passed him over the control as we taxied out into position. Port motor throttled back, a few bursts on the starboard, and we swung round into wind. "Not too quickly, young Dick, you'll strain the rear bay. Now then, gently forward with the throttle, wheel too, easy, easy old fellow, don't pull her back like that, she'll take herself off if you give her the chance."

And then we were off the ground over the wakening cantonment of Hinaidi at 4:30 a.m., the sun just coming over the horizon, two 500 h.p. Napier Lion motors purring contentedly at each other, and seven men and 500 lbs. of mail all headed westward for Cairo. Only a few minutes before, we were crossing the Tigris with the town of Baghdad spread along either bank. On the right the sun was just striking the golden dome and towers of the mosque at Khardimain. It is said that the pure gold on the dome alone is worth several fortunes.

But there were several other matters that required our attention at the start. Motors throttled back, we were using the heavy four bladed props. and did not need more than 1850 revolutions. The radio operator unreeled his antenna and established communication with the home station. Our messages would go out at half hourly intervals from now on for the rest of the flight. Then as soon as we reached our proposed height, 3,000 feet, I checked up on the windspeed and direction.

"O.K. Baghdad. This is Vernon 7045 passing Habbaniyah 0815 hours G.M.T."

This was our message informing Baghdad of our position. Owing to the difference in the local times of the points of departure and arrival, Greenwich Mean Time was always used on these flights.

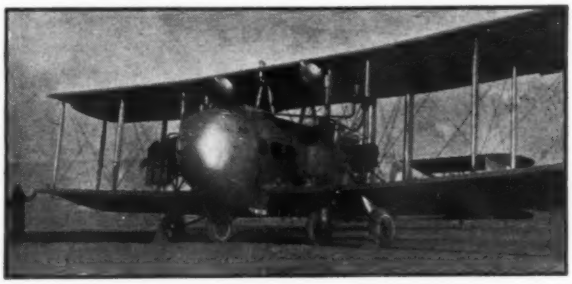
The lake, by the way, was the last physical landmark for many hundred miles. Thereafter it was dessert, desert, desert for as far as the eye can see. Brown in all its known shades, but not a contrasting hue to relieve it. We took hour and hour about at the controls. I peeked from time to time at the instruments. The passengers in the cabin had settled back to their books and magazines. The crew had hung chagouls out of the window. Chagouls are canvas bags made in the form of bottles, holding about two quarts of water apiece. Hung outside of a moving plane, the water is kept remarkably cool.

For nearly seven hours we flew monotonously on and on, messages coming and going regularly. I checked the course every half hour and Dick studied maps during his periods of rest, but nothing happened to disturb us. It

was so idyllic that I should have been suspicious. At about half an hour before noon I signalled the radio operator to wind in and Dick brought her down. The speedometer was showing 65 till I shook my head and pointed out the 75 mark to him. In those climates an extra ten miles per hour to the landing speed is always good. He landed her so softly that it wasn't till we shut off the motors that one of the passengers awoke. We halted in front of a sunken tank, about twelve inches of which was exposed. A small enough mark on which to set a bearing over 500 miles of desert. This was our refuelling station, and while most of us busied ourselves with the pumps and tubing, the rest got busy with refreshments. It was great to stretch the legs again, but boy, the temperature!

We halt on the desert for refreshments and fuel. Arab police on the left

The wind was getting up too. I looked around anxiously as a few flurries of sand blew round the machine. "Get a move on, fellows," I urged. "If this wind gets up much more we shall be sitting here till it's over." I meant it too, but I suppose it is particularly hard to ignore the wishes of others when they run in line with your own, and having got so far, we were all anxious to have the trip over.



We prepare to take off after our forced landing in the Dead Sea, 1,400 feet below sea level

The wind had risen before we started and the visibility definitely decreased. A thin brown veil of flying sand was responsible for this. Sane judgment told me to stay where I was, but I listened instead to the urgings of the others. I realized my foolishness as soon as we were off the ground. The horizon had darkened, was rapidly getting darker, visibility had already decreased to about a mile, sand was rising in all directions and the worst part of the trip was yet to come. From here on to the Dead Sea the ground rose to a height of about 5,000 feet. For 150 miles it was broken and mountainous without a good patch on which to land.

Dick looked at me curiously once or twice but I refused to meet his eyes and kept busy with my own reflections. If I could get height enough, the sand would not be so thick. It might be merely a local disturbance, and if it wasn't, I had enough gas to reach Cairo, and wasn't particularly worried at not being able to see the ground in between. So urging the throttle slightly forward, I kept the speedometer needle at a steady 60 while I watched the altimeter record five, six, seven thousand.

Nothing could be seen in any direction now. The plane was rocking uncomfortably and the flying sand on the bare skin was painful. We normally flew in tropical flying helmets and khaki shirts open at the front, but now we had donned our overcoats and turned up the collars in our efforts to protect ourselves as much as possible from the flying sand.

Dick was looking worried and no wonder, poor kid, though he only knew the half of it. I knew what would be the result of too much sand getting into our air intakes. That was why I was striving for altitude where I hoped it would be thinner.

It was half an hour, maybe, from the time we started when it happened—a significant sputter of the port engine. Soon the sputter would be a cough, then the other motor would join in. It was just a matter of minutes. My mind raced desperately. There was one chance. We must be somewhere over the Dead Sea, 2,500 feet below us must be the mountains surrounding it, but 6,500 feet below them was the Dead Sea, 1,500 feet blow sea level.

In its southernmost extremity was a spit of land that might be used in an emergency. Down there by the water, completely surrounded by the hills the visibility would probably be clear enough for me to distinguish the land, but could I find my way down to the water level? It was the only chance, I could think of nothing else.

I signalled Dick to have the antenna wound in and eased back the throttle of both motors. Then commenced some of the most uncomfortable flying moments I have ever spent. Anxiously we fixed our eyes on the altimeter as the needle sank slowly backwards, anxiously we peered over the side trying in vain to pierce the veil of flying yellow sand that so completely surrounded us. Our feet were tense and our bodies held rigid in our seats as we braced ourselves against the half expected, dreaded shock of crashing against the unknown.

Five thousand, four thousand, we were below the level of the surrounding hills. We must be over the Dead Sea, but where? I hardly dared turn for fear of crashing into a side. Equally hard was it to keep on. Three thousand, two thousand, one thousand, zero! We held our breaths. The altimeter ceased to be a guide any more. Built to record heights, it would not register depths. From here on it was guess work. I tried the throttle cautiously and the motor responded in a half hearted manner. I eased it back again. Dick was standing up and I pulled him back to his seat. It is funny the thoughts that come to one on occasions such as these. I remember thinking what a pity it was that this had to happen on Dick's first trip. He was standing up in his seat now, and I pulled him back by the coat. The slipstream from his body made things worse than ever. Suddenly a spray of salt water came over my side of the cockpit, and I did two things instantaneously which, I suppose, saved all our lives.

I gave full left rudder, more from the instincts, I suppose, of a child who puts up his arms to ward something off, and I eased the wheel back. We slipped round almost at right angles, sinking down slowly with failing flying speed. I saw Dick out of the corner of my eye unbuckling his belt and then the wheels grated. Jolts! I pulled the wheel back further as our motion ceased. Everything around was yellow, dim and blurred. A mechanic ran round to the front. "Port tire gone, Sir." "All right, Conley, get the screw (*Continued on page* 41)

HOW WELL DO YOU KNOW YOUR AIRPLANES?

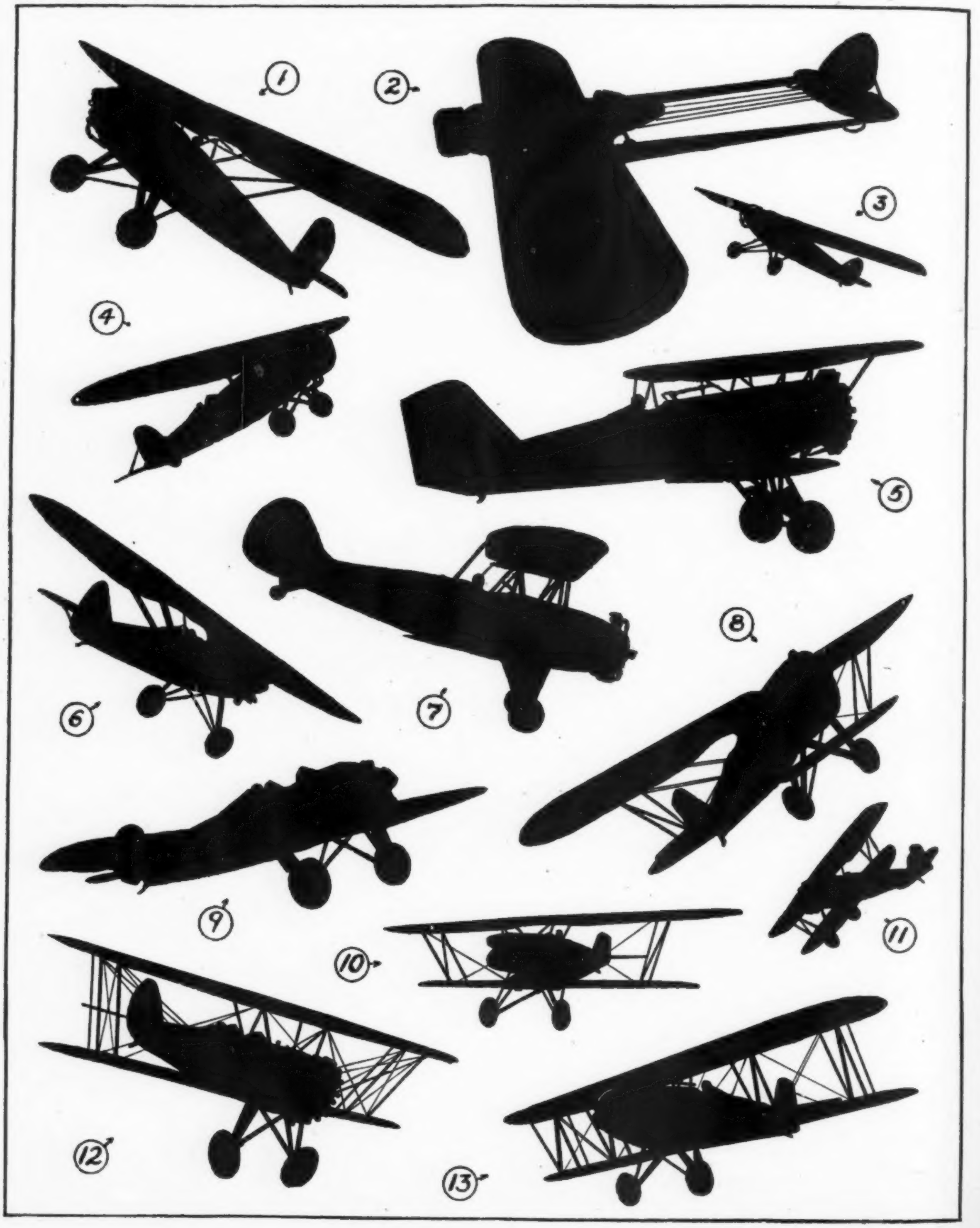
What Are the Names of the Airplanes Silhouetted on This Page?

The following awards will be paid by MODEL AIRPLANE NEWS to the persons whose letters, in the opinions of the judges, show the greatest evidence of accuracy, neatness, and attention to detail. The winners will be judged by Mr. H. A. Keller, Editor and Writer; Mr. Charles H. Grant, Editor of MODEL AIRPLANE NEWS, and Mr. Herbert Clark, Vice-President of Gray Band Publishing Corp.

Award for First Place, $5.00; award for Second Place, $3.00; award for Third Place, $2.00.

In the event of two or more persons being tied for the first, second or third awards, both persons will be paid the award.

All entries, to be eligible for these awards, must be received not later than July 20th, 1932. Address all answers to Silhouette Award, care MODEL AIRPLANE NEWS, 570 Seventh Avenue, New York City.



The British Hawker Fury, and How You Can Build It

An Exact Scale Model of a World Famous Ship, That You Can Build to Serve Several Purposes

By Stockton Ferris, Jr.

THE Hawker Fury is one of the most formidable fighters of the British air fleet. In fact, it is claimed, according to the official figures, to be the highest performance service military airplane in the world. It is a single seater interceptor fighter, and is used in the British Navy for deck landing. The large plane itself is constructed of metal throughout, while a super-charged Rolls Royce F-XI.S engine propels it at tremendous speed. It is claimed this ship will fly at 215 MPH and climb to 20,000 feet in 9 minutes 40 seconds. The total weight loaded is 3,203 lbs. 70 gallons of gasoline are carried. The tremendous speed of this ship is due to several factors, namely, its water cooled engine which is entirely enclosed, its smooth clean design, and its extremely light construction. As this ship is one of the greatest fighting airplanes in the world, it should prove to be very interesting to complete your air fleet by building a model of it.

IN THIS article it has been attempted to represent a model which can be constructed as the builder wishes, either as scale, flying, or both at once.

The directions are divided into three principal parts, the first telling how to build it as a flying scale ship, the second, as a pure scale model, and the third, suggestions for gaining endurance as a flying model.

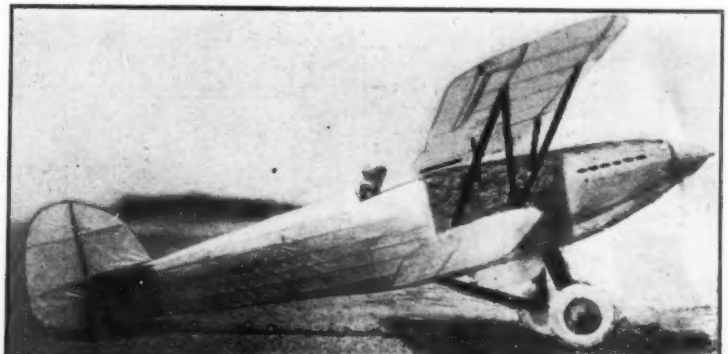
If you work carefully and follow the instructions closely you will have a ship that will delight you with its flying qualities and true-scale looks.

As the plans are printed actual size many of the minor dimensions have been omitted—get them by using a rule.

Scale—Flying Model

LIST OF MATERIAL

1 Block balsa, 4¼ x 3¼ x 2½ for nose.
1 Block balsa, 2⅝ + x ⅝+ x 1¾ + for radiator.
12 Pcs. (app) 1/16 sq. 36" long, spars, longerons, etc.
1 Pc. flat balsa, 2 x 6 x 3/32 wing struts, rear landing gear struts.
1 Pc. ⅛ x 4¼ x ⅜ axle.
1 Pc. 1/16 x 12 x 2, tail struts, cabane struts, C. S. spars, aileron, leading edge, butt ribbs, etc.
1 Pair 1⅞" wheels. (Preferably celluloid for flying.)
1 Sheet balsa 36 x 1/32 x 2, ribs, fuslage fairing.
2 Pcs. balsa ⅛ sq. x 24, leading edges.
5 Pcs. bamboo ⅜ x 15, trailing edges, tail outlines, etc.
Small piece celluloid, windshield.
Small piece aluminum (heavy), Trust Bearing.
8 Small dress snaps (optional).
1 Pc. 2¾ x 3/16 x ⅝, dummy shock absorber.
2 Sheets Japanese tissue 20 x 24, covering.
1 Pc. .034 music wire, about 6" long, Prop shaft, rear hook, "S" hook.
Can cement. Can silver dope.
Some black, blue, and red lacquer.
12 feet ⅛ inch flat rubber.
Thread, washers, pins, etc.
Prop block 8 x ⅝ x ¾ for scale model.
Prop block app. 9 x 1⅛ x ⅝ for flying model.



Warming "er" up for the "take-off"

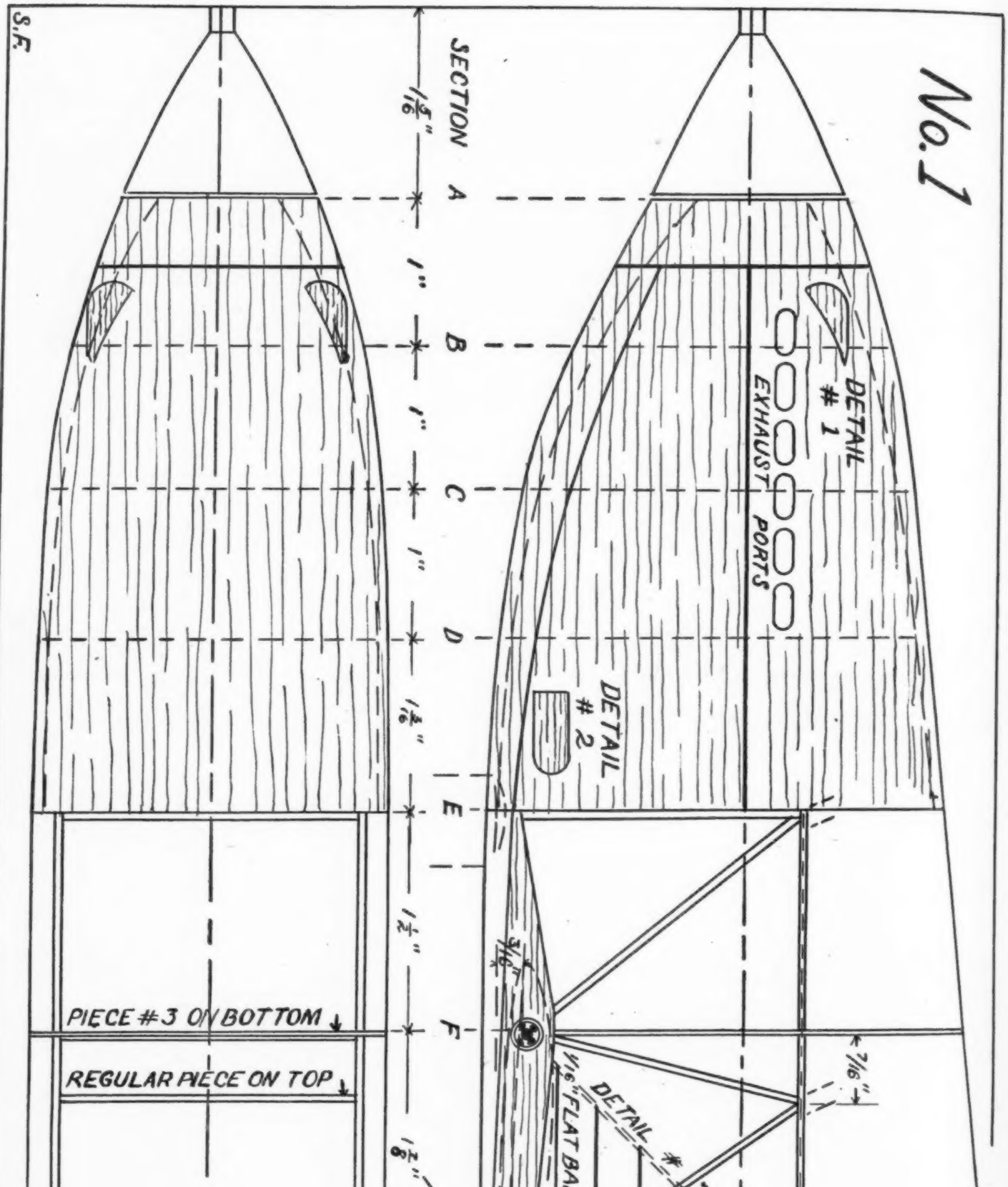
BUILDING

Fuselage

Probably the best way to start is to lay out the fuselage sides of the 1/16 sq. strips, and while this is drying, go to work on the nose block. Cut this close to the dimensions on the side view, then from the top. After this fuselage stations "A," "B," "C," "D" and "E," show the exact cross sections. Details No. 1 and No. 2 are found in Fig. 6. They are added after the cowling has been finished as smoothly as it is possible to get it. One end of a capsule would be excellent for detail 2 as it is an intake, and open at the front. The cowling is split and hollowed out to the approximate thickness shown by the dotted lines in the side views and in the cross sections. The heavy lines on the side view are to represent the seams in the cowling on the real ship. The thrust bearing is bent from the pattern in Fig. 7 and forced into the nose.

By this time we are ready to come back to the fuselage proper. You will notice, if you study the cross sections in Figs. 4 and 5 that it has a combination of both bulkhead and strut construction. This is lighter for the same strength, and still retains the bulging sides of the bulkhead method. The cross pieces and the diagonals are the same size as the longerons, 1/16 square. The former or bulkhead portion, is made of 1/32 flat balsa. The tail post is not one piece with the fin spar but is shown by itself at "L" Fig. 4. The shape of the rear hook can be seen in the top view of the fuselage, and entirely encircles the tail post. Therefore the fin spar is cut at this point to form a smooth rear for the fuselage. When the rear part of the fuselage is done, it should be joined to the cowling so that the tops of the first two bulkheads and the top of the cowling all form a straight line.

The positions of the bamboo stringers are shown by the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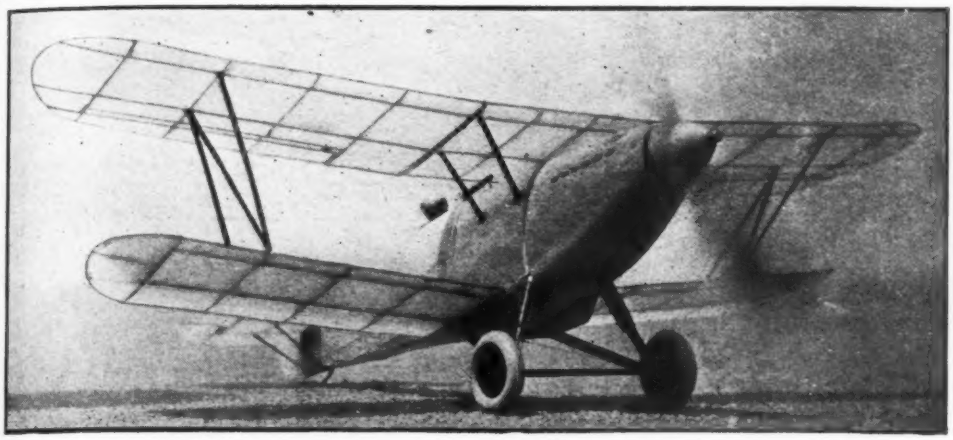
DETAIL # 2
PIECE #3 ON BOTTOM
REGULAR PIECE ON TOP
PIECE #4 ON BOTTOM
REGULAR PIECE ON TOP
BOTTOM ONLY
FLAT BALSA
DETAIL



Here she is ready to go. This model is not only built faithfully to scale, but the general design lends stability in flight. Use a large propeller as suggested in the article if you wish a real flying scale model

heavy lines in the top and side view. The top stringer in the turtleback is of balsa so that the pull of the dope will not draw it in.

The forward portion of the fuselage about the cockpit has a cowl of very thin balsa (about 1/64"). The seams and general arrangement of this is shown clearly in Fig. 7.

Wings

From here we can go to the wings, Figs. 5 and 6. First cut the ribs. As the wings are not tapered, the only ones different from the rest are at the very tips.

The leading edge is of 1/8 sq. balsa cut and sanded to a triangular section. The tips and trailing edges are all in one piece. They are of bamboo and this should not be split any thinner than 1/32 sq. or the dope will warp it all out of shape.

The spars used in the wing panels are two pieces of 1/16 sq. each. A notch is cut in the top and bottom of each rib to receive them. This assures a full leading edge, and keeps the paper from sagging as much as it otherwise might. Although the spars of the center section are shown a lot heavier, they only are to be made this way if you use dress snaps to hold on the wings, as there has to be something to push against.

Ailerons are shown in the drawings but no instructions will be given in making them. Thread hinges are used as represented by the short lines at each end. NOTE—all the butt (next the fuselage) end ribs are of 1/16 balsa instead of 1/32.

Tail Surfaces

These are given in Fig. 3. They are shown movable as one can try many interesting experiments with a model built so. The hinges are made by passing a thread around one spar (with a needle), *between* that and the adjacent one, around this, and so on. A cross section of this would form a figure "8." These hinges move *very* easily if made correctly, and would be ideal to use with automatic controls. Also note that the elevators are balanced.

Covering

The fuselage will require four strips of paper, one for each side, and one each for the top and bottom. An opening should be left at the rear of the fuselage for the rubber.

The wings are covered by fastening the paper at the trailing edge, gluing to the two end ribs, gluing to the leading edge, then over it and back to the trailing edge the same way. The tips should be covered separately to insure a smooth job.

Be sure not to pull the wing out of shape in any way when covering.

After the plane has been covered, spray it with water and let it dry before doping it. This tightens it without adding any weight, and saves dope. (See end of article for color scheme.)

Landing Gear

Tail skid. A flat piece of bamboo glued to a piece of balsa, as given in the top and side views.

The undercarriage is typically British. It has the shock absorber struts in the front, a cross axle, and the two rear struts are hinged to move up and down where they join the fuselage. The only cross wires are between the two rear struts. The original model had workable shock absorbers, but they add a lot of unnecessary weight to a light model. The rear struts have the ends bound with thread and then have a 1/16" square bamboo peg forced into the end. This is also forced into the supporting piece of the lower wing. The exact position is shown in Figs. 1 and 7.

You will notice in Fig. 7 that the shock absorber strut and the rear landing gear strut seem to overlap, where they join the axle. This they do, but the inner side of the shock strut, and the outer side of the rear strut are sanded rather flat, so that when the two are placed together they touch the axle in almost the same spot.

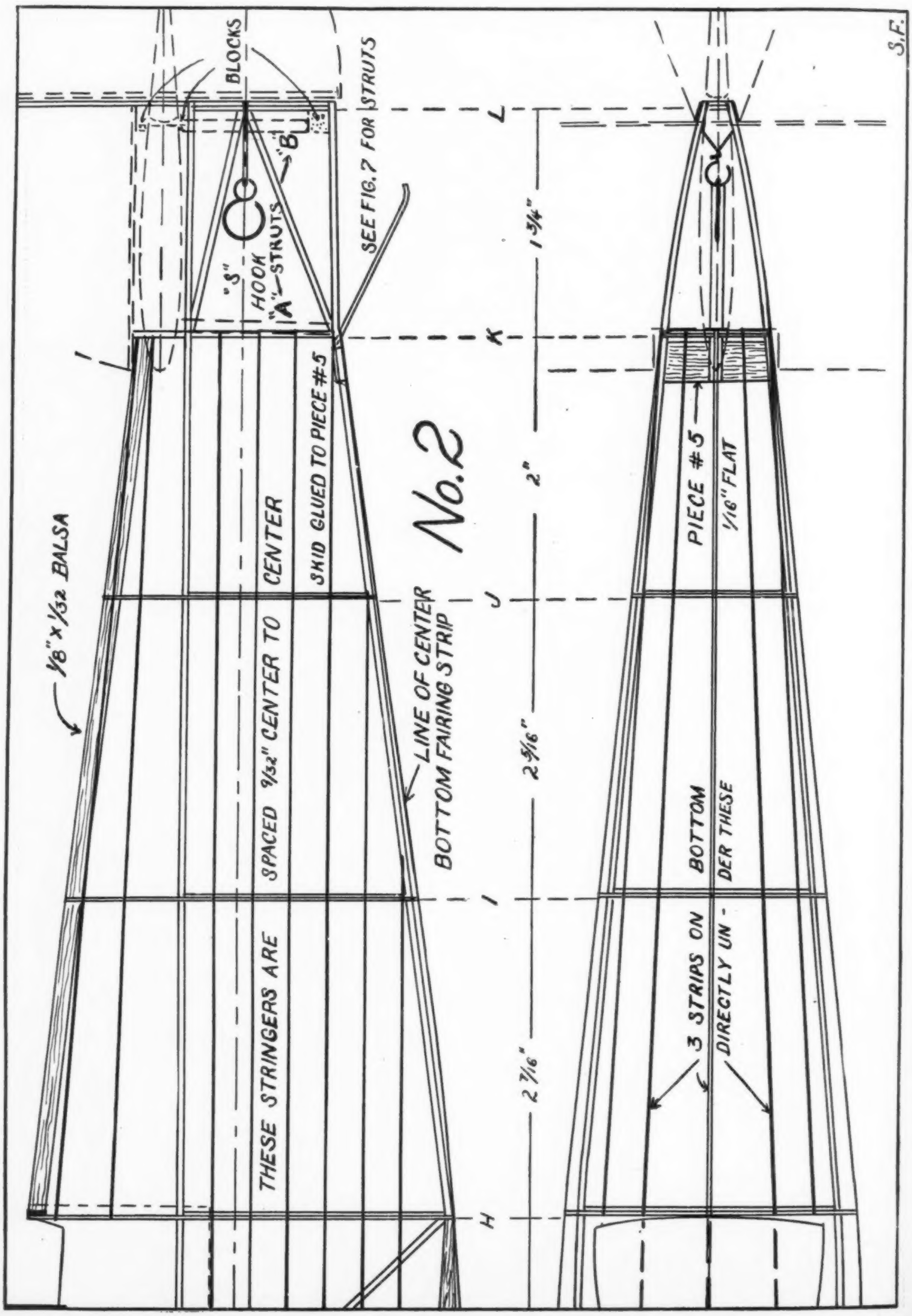
It is advisable in parts of a model that are to take considerable strain such as the landing gear, that parts be pegged together with bamboo and bound with thread as well as glued.

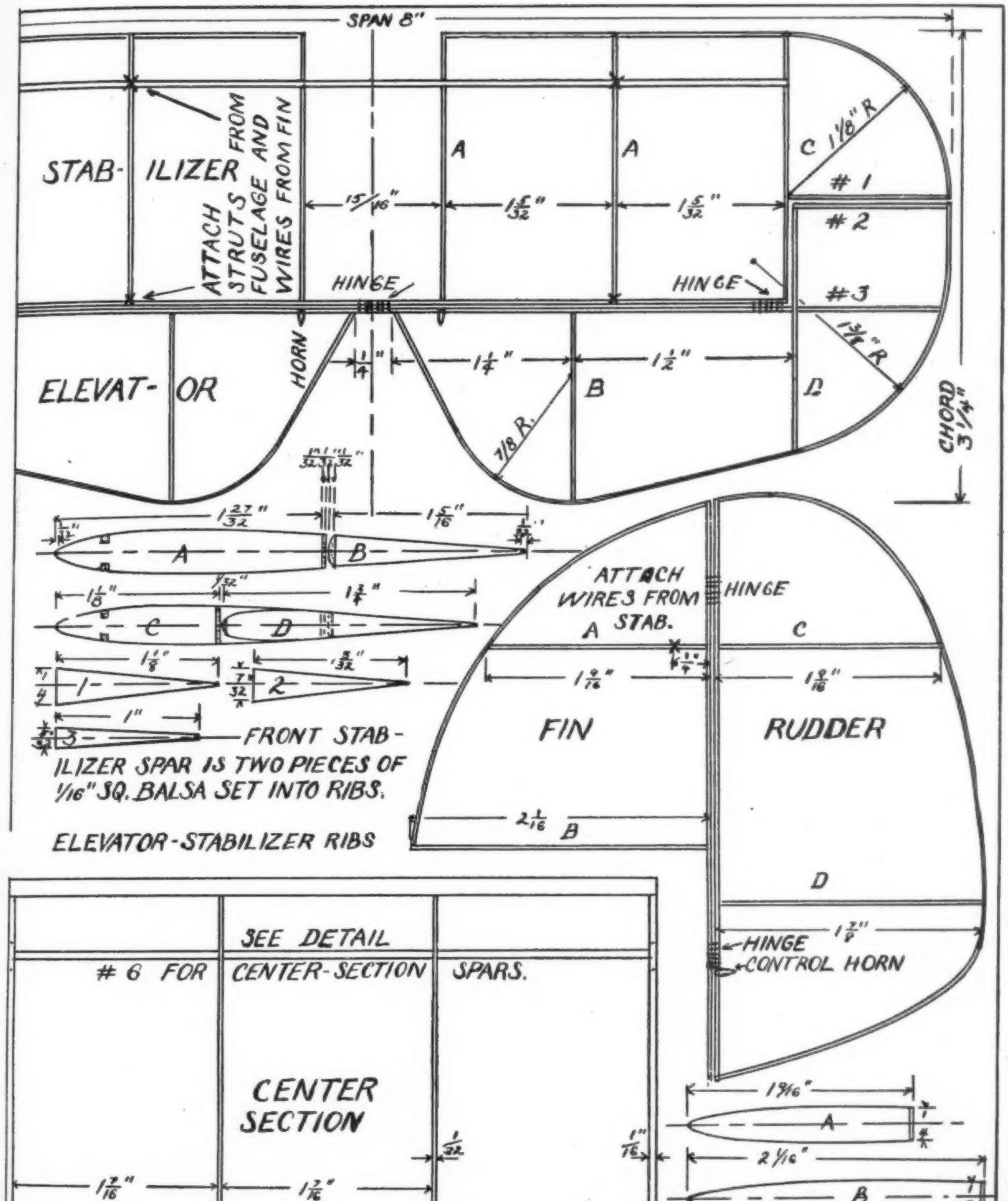
Radiator

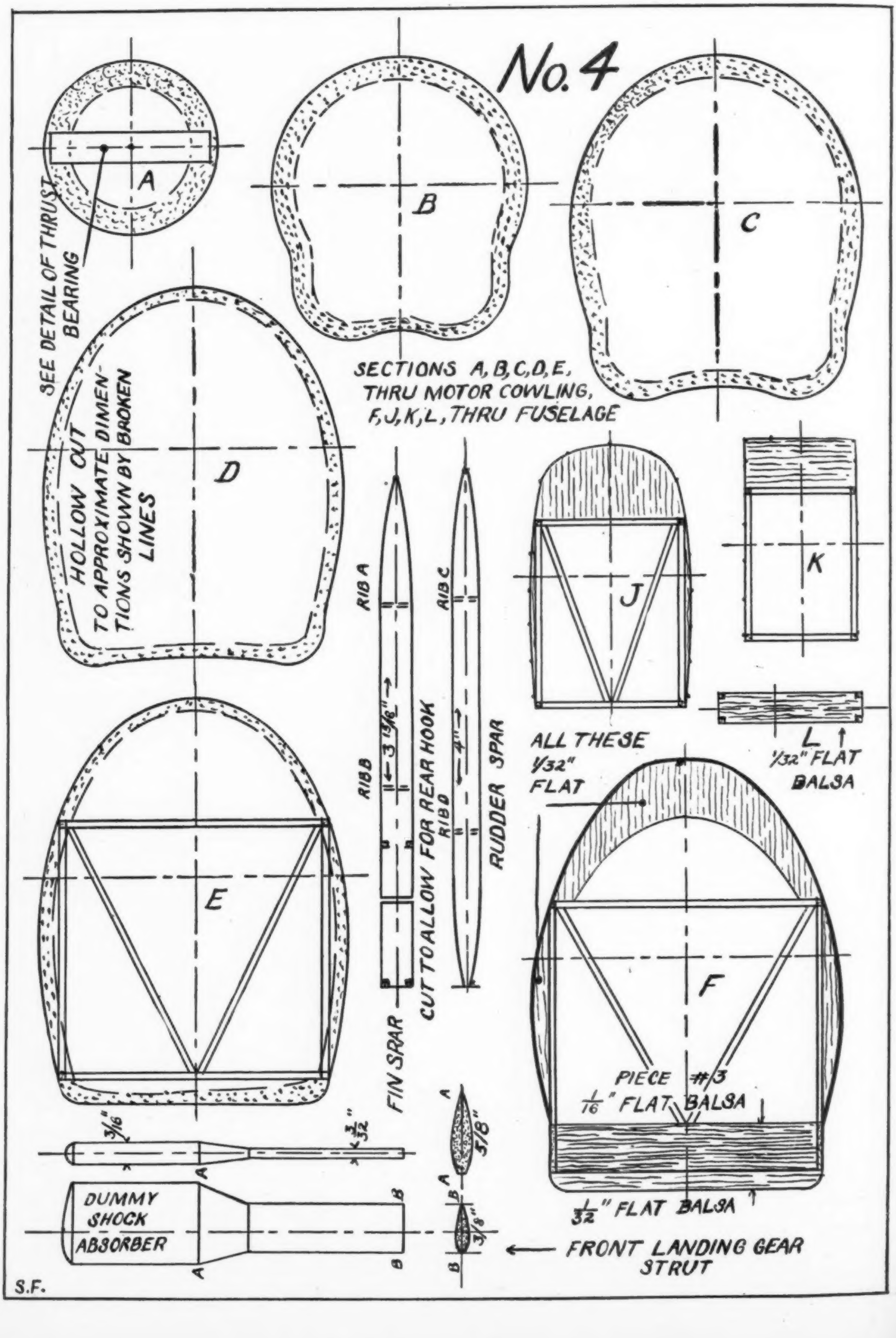
This is shown in Figs. 7 and 8, and is made in the same manner as the nose cowling, being cut from a solid block and then hollowed out for lightness. It is rather curiously tapered in the rear, the bottom going inward from the sides and upward, while the top remains rectangular.

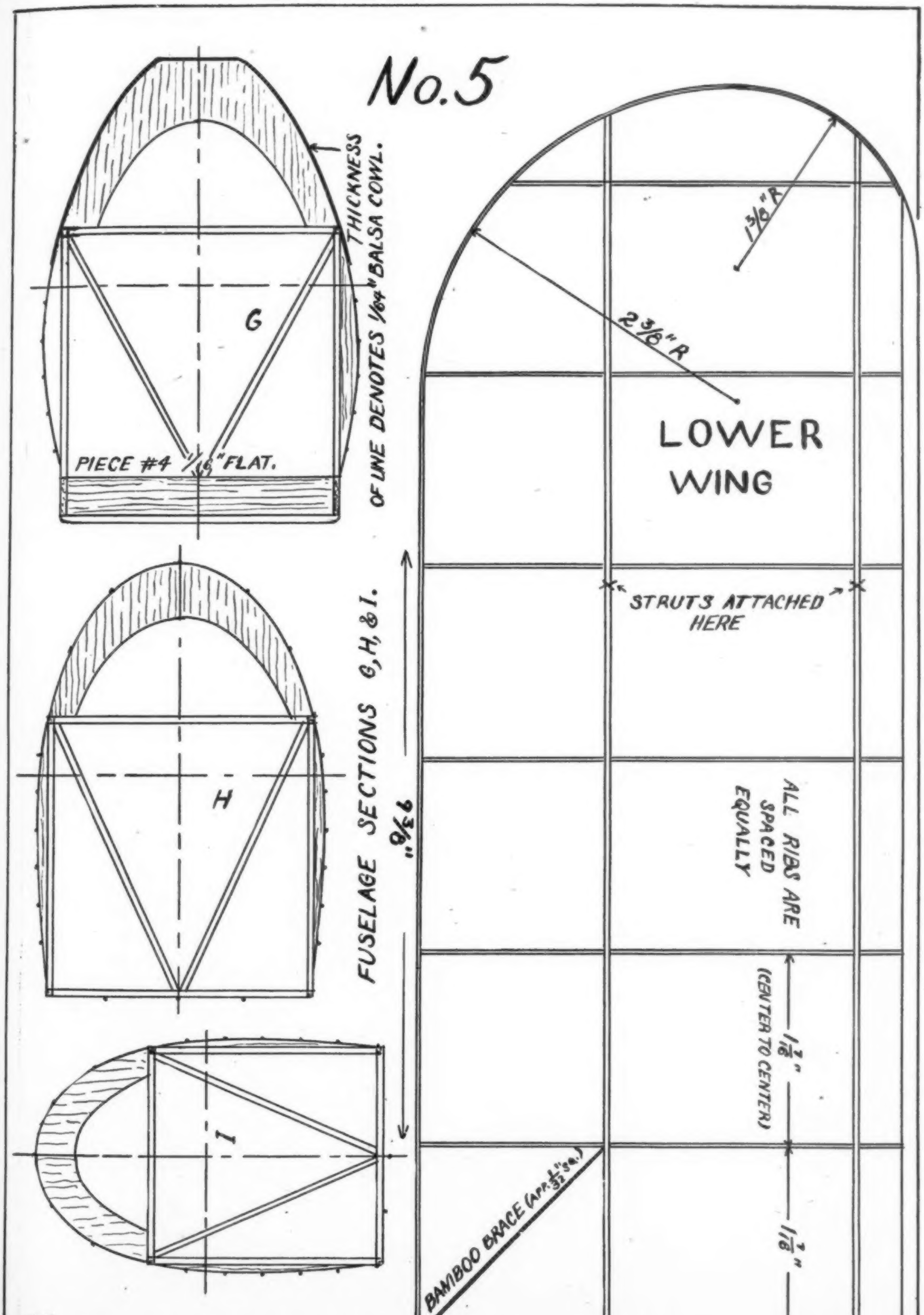
Struts

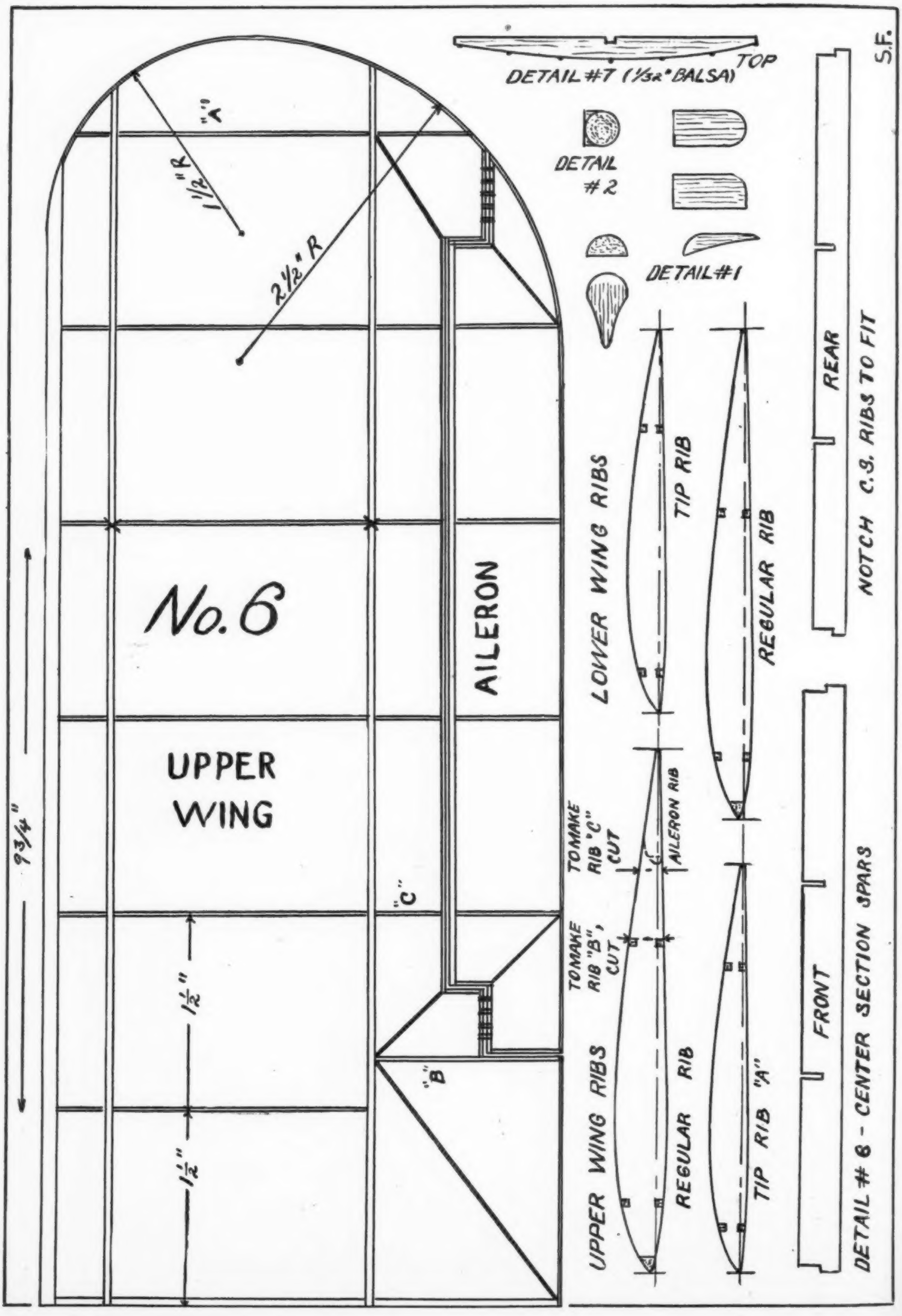
The outer wing struts and the cabane (center section) struts are given in Fig. 7, (*Continued on page* 37)

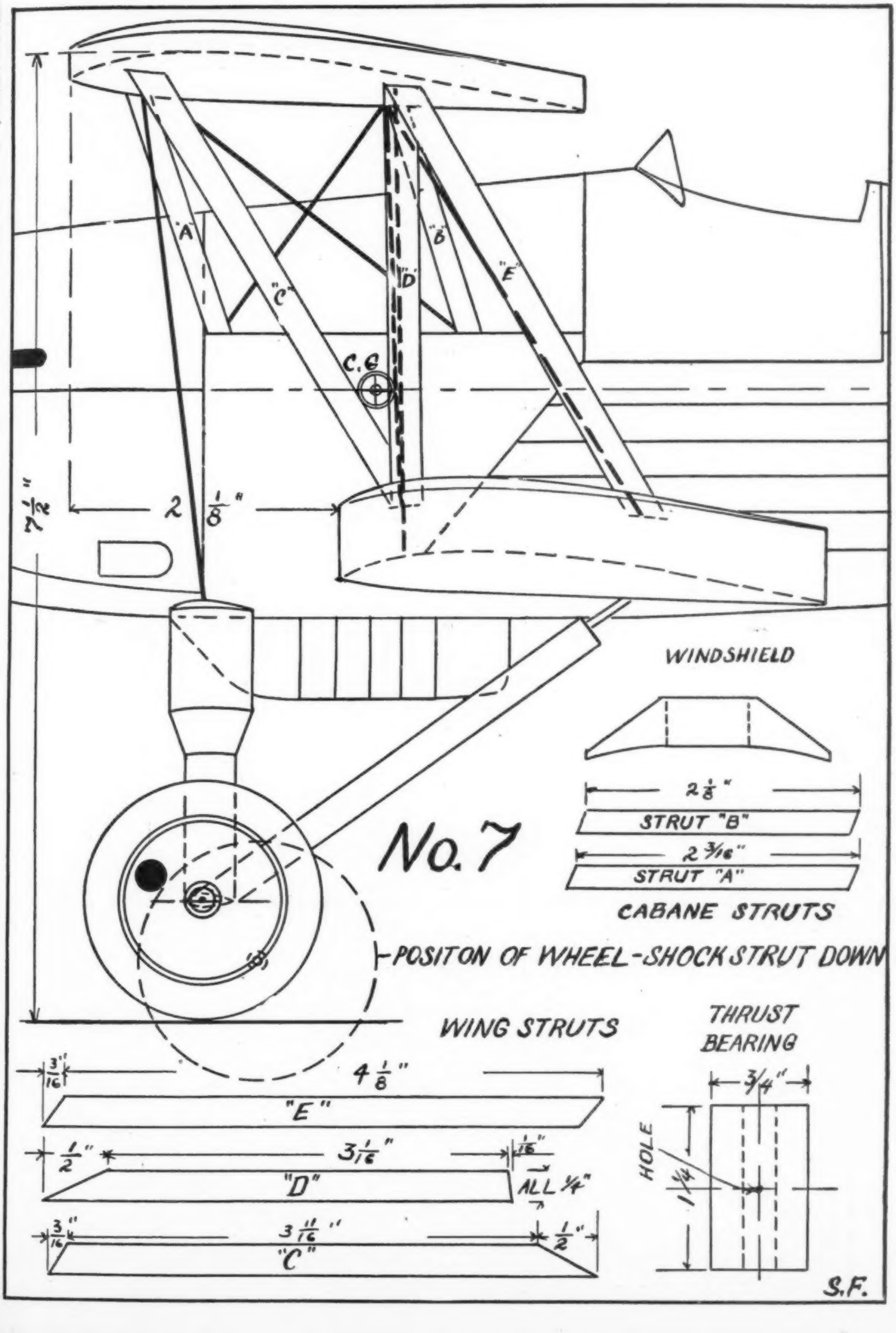

BLOCKS
SEE FIG. 7 FOR STRUTS
"S" HOOK
"A" STRUTS
"B"
L
K
J
I
H
1 3/4"
2"
2 5/16"
2 7/16"
No. 2
LINE OF CENTER BOTTOM FAIRING STRIP
SKID GLUED TO PIECE #5
THESE STRINGERS ARE SPACED 9/32" CENTER TO CENTER
1/8" x 1/32 BALSA
PIECE #5
1/16" FLAT
3 STRIPS ON BOTTOM DIRECTLY UNDER THESE
S.F.

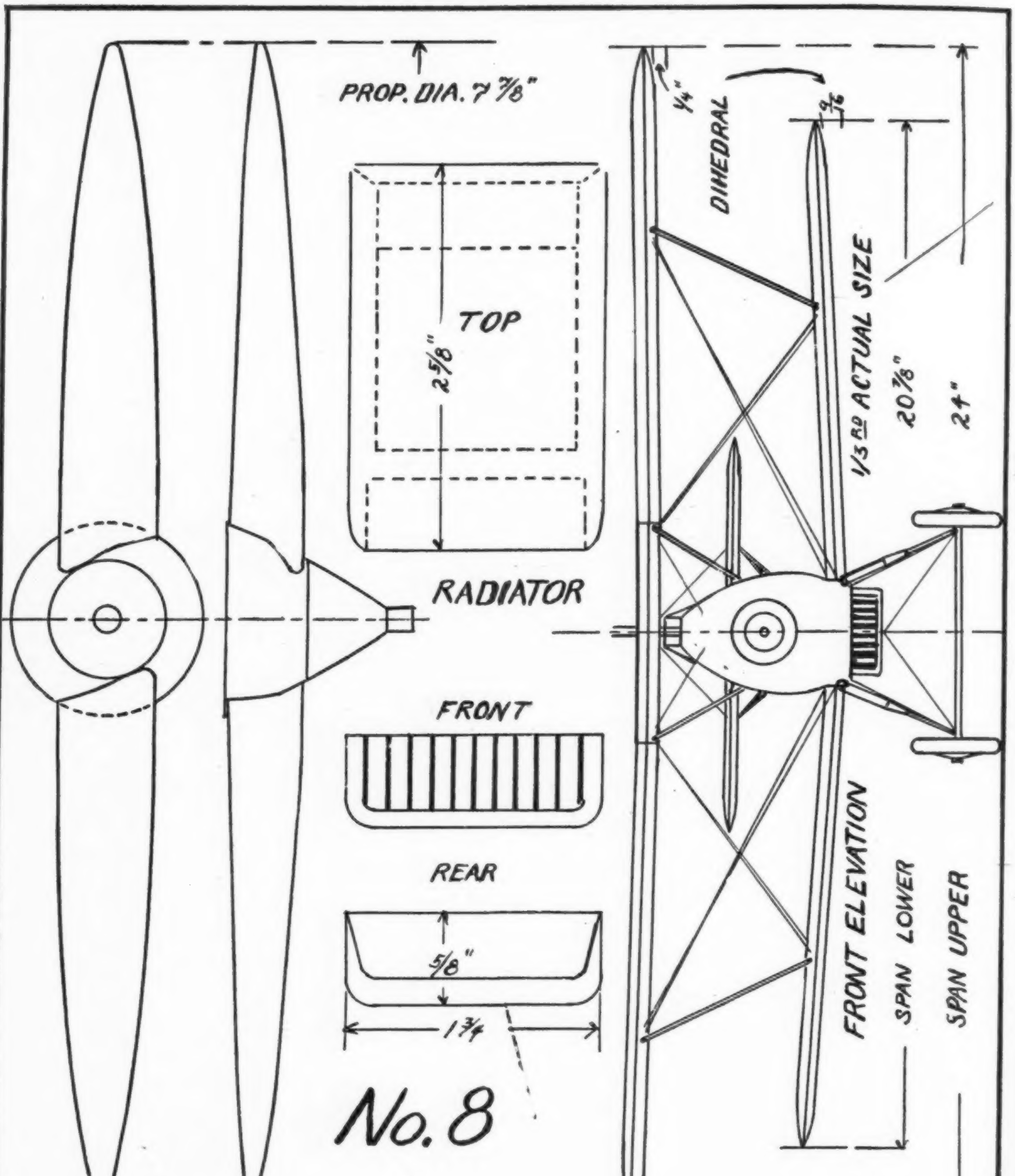

SPAN 8"
STAB- ILIZER
ATTACH STRUTS FROM FUSELAGE AND WIRES FROM FIN
A
A
C 1 1/8" R
1
2
3
HINGE
HINGE
ELEVAT- OR
HORN
B
D
1/8 R.
1 3/8" R
CHORD 3 1/4"
ATTACH WIRES FROM STAB.
HINGE
FIN
RUDDER
C
D
HINGE
CONTROL HORN
FRONT STAB- ILIZER SPAR IS TWO PIECES OF 1/16" SQ. BALSA SET INTO RIBS.
ELEVATOR-STABILIZER RIBS
SEE DETAIL # 6 FOR CENTER-SECTION SPARS.
CENTER SECTION
C.S. SPAN 4 1/2"
No.3
FIN AND RUDDER RIBS
S.F.


No. 4
A
SEE DETAIL OF THRUST BEARING
B
C
D
HOLLOW CUT TO APPROXIMATE DIMENTIONS SHOWN BY BROKEN LINES
SECTIONS A, B, C, D, E, THRU MOTOR COWLING, F, J, K, L, THRU FUSELAGE
J
K
L
1/32" FLAT BALSA
RIB A
RIB B
3 13/16"
RIB C
RIB D
4"
RUDDER SPAR
CUT TO ALLOW FOR REAR HOOK
FIN SPAR
ALL THESE 1/32" FLAT
E
F
PIECE #3 1/16" FLAT BALSA
1/32" FLAT BALSA
3/16"
1/32"
DUMMY SHOCK ABSORBER
3/8"
FRONT LANDING GEAR STRUT
S.F.

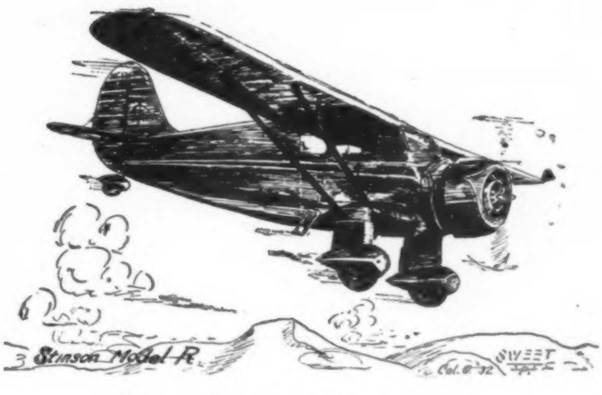

No. 5
THICKNESS OF LINE DENOTES 1/64" BALSA COWL.
G
PIECE #4 1/16" FLAT.
H
I
FUSELAGE SECTIONS G, H, & I.
9 3/8"
LOWER WING
1 3/8" R
2 3/8" R
STRUTS ATTACHED HERE
ALL RIBS ARE SPACED EQUALLY
1 7/8" (CENTER TO CENTER)
1 7/8"
BAMBOO BRACE (APP. 1/32" SQ.)
S.F.


No. 6
UPPER WING
AILERON
1 1/2" R
"A"
2 1/2" R
"C"
"B"
9 3/4"
1 1/2"
1 1/2"
DETAIL #7 (1/32" BALSA) TOP
DETAIL #2
DETAIL #1
LOWER WING RIBS
TIP RIB
REGULAR RIB
TO MAKE RIB "C" CUT
AILERON RIB
TO MAKE RIB "B", CUT
UPPER WING RIBS
REGULAR RIB
TIP RIB "A"
REAR
FRONT
NOTCH C.S. RIBS TO FIT
DETAIL # 6 - CENTER SECTION SPARS
S.F.


"A"
"B"
"C"
"D"
"E"
C.G
$7\frac{1}{2}$"
$2\frac{1}{8}$"
WINDSHIELD
$2\frac{1}{8}$"
STRUT "B"
$2\frac{3}{16}$"
STRUT "A"
CABANE STRUTS
No. 7
POSITON OF WHEEL-SHOCK STRUT DOWN
WING STRUTS
THRUST BEARING
$\frac{3}{16}$"
$4\frac{1}{8}$"
"E"
$\frac{1}{2}$"
$3\frac{1}{16}$"
$\frac{1}{16}$"
"D"
ALL ¼"
$\frac{3}{16}$"
$3\frac{11}{16}$"
$\frac{1}{2}$"
"C"
¾"
HOLE
$1\frac{1}{4}$
S.F.


PROP. DIA. 7 7/8"
TOP
2 5/8"
RADIATOR
FRONT
REAR
5/8"
1 3/4
No. 8
1/4" DIHEDRAL
9/16
1/3 RD ACTUAL SIZE
20 7/8"
24"
FRONT ELEVATION
SPAN LOWER
SPAN UPPER
THREAD
1/4" REAR, LANDING GEAR
1/4"
3 1/2"
8 1/4"
3/8" AXLE
TAIL STRUTS
1 11/16 A
1/8"
1 15/16" B
1/8"
S.F.

AIR—WAYS
HERE AND THERE

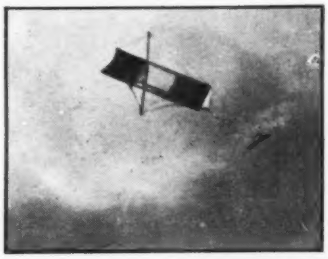


Drawn by Robert Sweet, age 17 years

Get Busy and "Air" Your "Ways" of Building and Flying Model Planes. In Each Issue of MODEL AIRPLANE NEWS, Space Will be Devoted to the Activities of Our Readers. Let OTHERS Know What YOU Are Doing

THE past month has been a very active one for our model builders. The postman has swamped us each morning with letters from all over the country, in fact, we can say correctly, the world. However, I am afraid that I must disappoint some of our readers this month as we have not the space to print all the pictures that have come through the mail. It has been necessary for us to select the most interesting ones, so in the future if you wish to have your picture appear on these pages, be sure that they are interesting and excellent from a photographic standpoint.

Picture No. 1. Boys of Nedrow, N. Y., launch their gliders from kites



Picture No. 2. Glider released when enough altitude has been gained

One of the most novel features that we have to offer is a bit of news from Lieut. H. A. Reynolds of Nedrow, N. Y. He and an enthusiastic group of young men have been experimenting with a device for launching model gliders from a kite. If possible, they intend to walk away with the prize at the National Soaring Contest to be held at Elmira, N. Y., in July. Their team is exceedingly expert.

Picture No. 1 shows a group of the fellows attaching a small glider to their kite by means of which they intend to get it aloft. Picture No. 2 shows the kite at a fair altitude and the small model in the act of parting with its big brother. Great activity is springing up in this field of aero endeavor and there should be some interesting results from the Elmira competition.

Picture No. 3 is another contribution from Lieut. Reynolds. It is a Canard built by Edgar Morris of Syracuse, N. Y. You can see that this group is a very progressive one and does not stick to the old beaten path. Pioneer work such as this among our model builders will be a large factor in the advancement of aviation.

Jack Clark of Portland, Ore., one of our old contributors, has sent us picture No. 4, showing his latest Parasol model in flight. This machine is not an exact scale model but rather a composite one, designed primarily to fly and yet to look like a real machine. We would appreciate it greatly if our readers would let us know whether or not they would like us to print the plans of this machine.

Vernon Jones of Thawville, Ill., sends us a very excellent picture of his Hawk in full flight, picture No. 5. When a fellow can make his scale model fly in this manner he surely has done a fine job, not only as far as construction is concerned, but also in regard to balance.

We have received a picture of a very beautiful model of a Loening Amphibian built by Kenneth Cook of Milwaukee, Wisc., picture No. 6. Mr. Cook built

Picture No. 3. A "Canard" in flight. A unique model built by Edgar Morris of Syracuse, N. Y.

Picture No. 4. Jack Clark of Portland, Ore., tries out a new "parasol"

Picture No. 5. A "Hawk"

Picture No. 6. A Loening by "Cook"

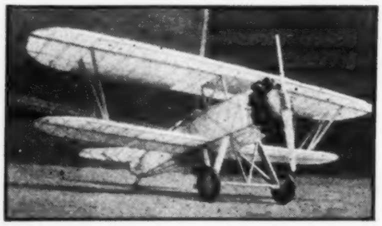
Picture No. 8. Johnston's D.H.4

this model and several like it especially for the Kohler Aviation Corporation as exhibition models. The models are fitted with spun aluminum drag rings and die-cast three-bladed propellers. They are painted in maroon and yellow in the same manner as large ships. In looking at this piece of work, it makes me wonder what has happened to the old time mechanic and craftsman. It must be very difficult for him to compete with the progressive and alert men of today.

The picture of the Eagle Rock, No. 7, has been sent in by Bob Mattison of Brookings, S. Dak., as a sample of his work. Bob has turned from the beaten path to build a model which has not usually occupied the attention of builders. It is very excellently constructed, especially as the wing span is only 6¾", which makes the assembly a very delicate operation.

Picture No. 10. Fokker F-10 by Charles Underhill

Picture No. 7.



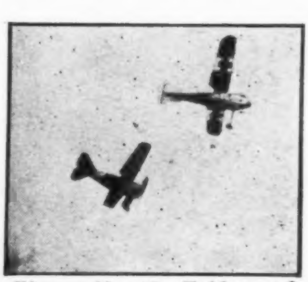
Picture No. 9. Gene Callahan's Boeing P-12 B

Here we have a picture of a D.H.-4 (No. 8) which has been constructed by Eugene R Johnston of Franklin, Pa. It is a very excellent piece of work. Eugene submitted this picture in the prize picture contest some time ago, taking third place. Great detail has been followed in the construction of this machine, even to the extent of the miniature machine gun in the rear cockpit. The workmanship, as you will note, is neat and accurate.

Honor Roll of Airplane Builders

Our honor roll of airplane builders is swelling to enormous proportions. In fact, we are wondering if it will not be so large eventually that we will have to print a list each month of those who build three or more models. However, the following is a list of names of boys who have built models at one time or another but who have not given the dates on which they were completed:

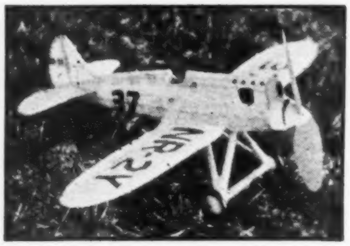
Picture No. 11. Nurmi's S.E.5



Picture No. 12. Fokker and Albatross in flight

Picture No. 14. Spad by Harry Trimble

Allen Price, Teaneck, N. J.; Cessna, DO-X.
Michael F. Cirone, Astoria, L. I.; Boeing P.12-B.
Harold Deutsch, Brooklyn, N. Y.; Laird Supersolution.
Richard R. Dewees, Philadelphia, Pa.; Baby R.O.G., Two-Way Glider.

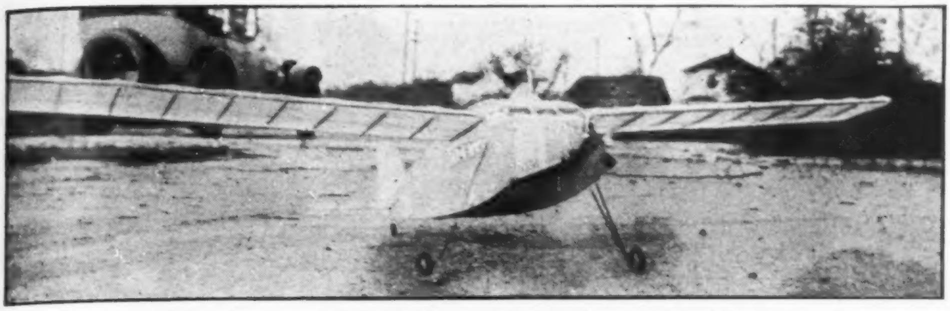


Picture No. 13. Howard Racer, by Harry Trimble, Ft. Leavenworth, Kan.

Chester G. Huff, Flint, Mich.
A. F. Kitchel, Jr., Andover, Mass.; Spad.
Claire Kube, Islip, L. I.; Fokker D-8.
La Mar Larson, Sandy, Utah; A.D.H. Gypsy Moth, Curtiss Hawk, Bremen, Lockheed Sirius, Boeing P.12-B., Mystery Ship, Winnie Mae, Army Falcon, Clark Low Wing, Smoke Screen.
Billie Piper, Montreal, Canada.
Carl Pehl, Monessen, Pa.; Fokker 14, Ford Trimotor, Curtiss Hawk, Hawker.
Reino Nurmi, Duluth, Minn.; S.E.5, Army Hawk.
O. A. Small, Raleigh, N. C.; S.E.5.
Gilbert Schwartz, Brooklyn, N. Y.
Harry Shorf, Islip, L. I.; Albatross D-8 C.
Harry Trimble, Ft. Leavenworth, Kans.; Spad, Howard Racer.
Charles Underhill, Jr., Long Beach, Cal.; Fokker F-10, Boeing F-4-B.
William A. Wilkes, San Jose, Cal.; Fokker "Tripe," Albatross, Sopwith Camel, Spec. Spad, Aviatik, Lizenz Bomber, Bristol, Sikorsky, Rohrbach Roman, Lockheed Sirius, Junkers G-31.
Steve Wasnewski, Brooklyn, N. Y.; Lockheed Sirius, Boeing P.12, Mono.

Young aeronauts who have built ships during the months of February and March are:

Louis J. Dunn, Adrian, Mich.; Gee-Bee Racer.
Howard Earp, Payette, Idaho; Lockheed Low Wing Sirius.



Picture No. 15. One of the first steam models since Langley's time By Wm. Utzinger, Dayton, O.

Gene Callahan, Newport, Ky.; Boeing P.12 B.

Cecil Denis, Chicopee Falls, Mass.; 2 Twin Pushers, Gee - Bee Supersportster, Midget Model.

Warren E. Franklin, Lancaster, Ohio.; Fokker Triplane.

Donald O'Hearne, Saskatoon, Sask., Canada; Spad, D. H. 77.

Picture No. 16. Wm. Utzinger and his D.O.-X

Edward Jarzombeck, Chicago, Ill.; Boeing P-12-B.

Frank J. Loughlin, Woodhaven, N. Y.; Texaco 13, S.E.5, Lockheed Vega.

P. J. Letourneau, St. Paul, Minn.; Ford Express, Boeing P-12-B.

Bruce Lester, Forest, Ontario, Canada; S.E.5.

Leo Mulvihill, Brooklyn, N. Y.; Curtiss Hell-Diver.

V. I. McCallum, Thetford Mines, Que., Canada; S.E.5.

E. Cedric Nichols, Burlington, Vt.; Fokker Trimotor, Curtiss Hawk, Flying Scale Model Autogiro, Flying Sopwith Camel.

Joseph Napoli, Brooklyn, N. Y.; Curtiss Condor, Bull-Pup.

Daniel Puglis, Fairview, N. J.; Pfalz D-3 Scout, Rumpler Type C-V, Albatross D-3 Pursuit, Gloster IV, Ansalso Biplane, D.H.4, "G.B." 22 Supersportster, Laird Supersolution, Fokker D-8, Nieuport, Ford Trimotor, Bristol F2B.

Warren Pennell, East Landsdowne, Pa.; Curtiss Hell-Diver.

Art Tyler, Maywood, Ill.; Winnie Mae, S.E.5.

Carl Thunder, Marshall, Mich.; S.E.5.

Morris Wiesenthal, New York, N. Y.; Winnie Mae.

Alfred Van Wymersch, Forest, Bruxelles, Belgium; Fokker Triplane, A. B. Sportster, Polish P.6 Fighter.

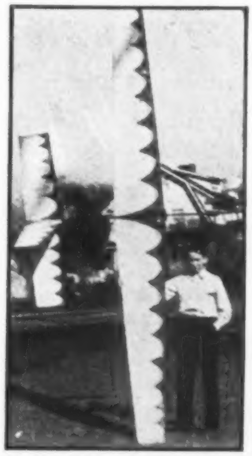
Our April list so far is very small. It consists of only two names.

I suppose that the Spring has gotten into the bones of some readers and that they just have not "got going" on their model building during this month.

Several of these builders have honored us with photographs of their machines.

Gene Callahan sends us a very excellent picture, from the photographic standpoint (No. 9), of his Boeing P.12 B. Pursuit Plane. The detail in this machine is very fine, as you can see. He tells us that it is a non-flying scale model with a wing spread of 24 inches. It is equipped with a complete set of controls and fire extinguisher, cushion seat, safety belt, an instrument board with miniature instruments. He does not tell us whether the instruments work or not, but if he told us that this were actually the case, I would not be surprised.

Picture No. 21. Bridgeport Boys in Conference



Picture No. 27. Gliders seem to be growing. Stanley Congdon

Picture No. 20. Directors, Judges, and Winners, Leavitt Model Club

Picture No. 26. Contestants in Sidney, Australia, Contest. Ivor Freshman supervises activities

Here is another scale model that has been remarkably constructed by Charles Underhill, Jr. It is a Fokker F-10, shown in picture No. 10. Charles must have been trying to outdo Gene Callahan for he comes out with a few other innovations such as cabin, dome and wall lights, carpet on the floor, six chairs, a lounge, and a card table. He does not say whether he has miniature cards on the table or not. However, I should say that he has dealt us a hand ace high in building this model. In the pilot's cabin, there are two seats with a dummy control and instrument board. The span of the wings is 36 inches and it is made of balsa. The fuselage is built up from 3/16 inch spruce members and covered with airplane linen, doped. The wing and tail surfaces are gold, the fuselage green, and the cowlings and the nacelles are aluminum. The three "props" are made from chromium-plated brass. Well, I should say that was some model.

Picture No. 25. Australians are up and coming

Picture No. 22. S.E.5.B. Mod. Research Lab.

Reino Nurmi of Duluth, Minn., is the parent of picture No. 11, which clearly shows his little S.E.5 biplane in flight, having made an R.O.G. take-off. I am sure that our friends would like to know more about this little model built by Nurmi because of the beautiful flight which it is making in the picture. Many of our friends have sent in pictures of the S.E.5 which seems to be a very popular ship. However, most of them have not been so fortunate as to obtain a picture which shows the flying qualities of their models to as large an extent as this one does.

Speaking of flying pictures, take a look at picture No. 12. In sending this one to us, Claire Kube establishes his reputation as an expert. Here are shown a Fokker D-7 and an Albatross in flight at the same time. This is not an impossible thing, but it is certainly very unusual. Contrary possibly to the opinion of some of the readers, this picture has not been faked. The original photograph sent to the office shows clearly that these two machines are in actual flight.

Harry Trimble of Ft. Leavenworth, Kansas, is responsible for the remarkably built Howard Racer in picture No. 13, and the Spad, No. 14. I should say that the Howard Racer was as fine a piece of model building as has been published in this magazine for a long time.

Picture No. 24. Winners at Eastern States Model Meet

Club News

We wish to apologize to several of our fellow clubs for not mentioning their activities in the last issue. This was an oversight on our part for which we hope to compensate in the following columns. We have word from the National Advance (*Continued on page* 40)

The Miniature Flying Fool

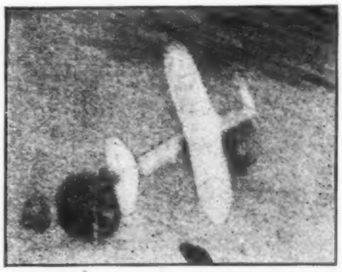
A Snappy Little Biplane That Is a Real Flier Yet Very Easy to Build

By Howard McEntee

THIS model is called experimental because it can be used for a variety of purposes. By using propellers of different pitches, and with different motors a wide range of performance will result. The machine is a remarkable climber, in fact, it was designed expressly for that purpose. It is very fast, but no attempt has been made to check speed. It can be made to do many stunts, such as rolls and loops, but it will not spin. The duration with a low pitch speed propeller and five strands of 1/16" square rubber is over 30 seconds, but with proper motor and high pitch propeller it will be much better.

During the past winter the little ship was used with skis and performed beautifully. For use on the water, a pair of floats have been fitted to it, which it carries with ease. As yet, there have been no R. O. W. flights, since the only available water is a lily pool 12 feet long.

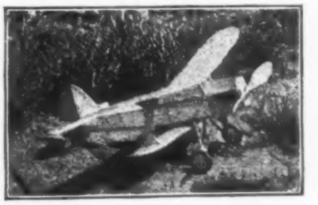
As may be seen, it follows no particular large ship in design, but is a combination of many. The fuselage is original, and is strong, easy to build and makes mounting the wings a "cinch."



A quick take-off and steep climb characterize this little plane

The writer strongly advises that all model builders, beginners or otherwise, try this design as it is simple, pleasing in line and its unfailing performance will make it a favorite.

Just like a large ship, and flies like one



As sweet a ship as ever took an air bump

The fuselage is of soft balsa 1/16" square. The sides are made first, the two being alike. They may be made on a board directly over the plan, with wax paper between. The formers are all of 1/32" medium balsa. Cut them out while the sides are drying. Make two of No. 1, four of No. 5, and one each of all others.

When the second side is dry do not remove it from the board, as the fuselage assembly should be started first. Glue all No. 1, No. 2 and No. 5 formers in their proper places on the side, still on the board. When they are partly dried, put the remaining side in place with glue, using small cans or bottles to hold the whole in the proper position. Be sure the parts are correctly lined up and let them dry thoroughly. When dry, carefully remove the assembly and install the other formers. The nose block A, with the hole cut, may be glued on now. The piece B, which is to hold the rear of the motor stick may now be put in. Do not put the rudder post C in yet. The fuselage is finished by gluing on the top and bottom 1/16" square pieces D, E, and F. The cockpit outline is of reed, 1/16" in diameter. The celluloid windshield adds a finishing touch.

The horizontal tail is made entirely of bamboo, and should be made directly over the drawing, using a board underneath. The outline is made in halves from one piece, split after bending. It should be trimmed to about 1/32" square. The spar G is about 1/16" x 1/32" bamboo and the ribs 1/32" x 1/64". When dry the tail is glued flat to the top longerons. The rudder post C of 1/16" x 1/32" bamboo is now glued in place. The tail skid of small music wire is also installed. The rudder outline is of 1/16" diameter reed soaked and bent to the proper shape, and held with pins. When dry, it may be glued in place as shown on Figure 1. The small balsa piece I holds the lower end firmly to the fuselage.

The fuselage and tail should now be covered. Although covering at this time deviates somewhat from accepted practice, it makes it infinitely easier than to wait until the framework is finished. The landing gear Vees, made of two pieces each, should be built on a board and cut off when dry. Cut the paper away from the wood where the Vees join the fuselage so that the glue may get a good hold. The Vees are held with pins stuck into the fuselage until dry. The brace struts J are 1/16" x 1/32" bamboo and may have a piece of radio "spaghetti tubing" slipped on each for a dummy shock absorber. These are shown as K on Figure 2.

The axles of music wire have a loop in each to allow shock absorbing action. The loop is made by wrapping the wire tightly around a 1/16" diameter nail held in a vise. It will spring out somewhat to the proper size. Glue and bind the axles in place. The wheels may be of wood or celluloid, but should be light in weight.

The motor stick is 1/8" square hard balsa. The rear hook and propeller hanger are glued and bound in their proper places. There are three balsa pieces L, M, N, glued to the front of the motor stick, shown in detail on Figure 1. When dry, they are tapered slightly to the rear with sandpaper so the whole assembly will slide in the nose block A and hold tightly when pushed all the way in.

The propeller is of the toothpick type, cut from a blank of dimensions shown on Figure 2. The motor varies according to the performance required, but four strands of 1/16" square rubber will give good flights. Use more for maximum speed and climb.

The wings should be made flat on a board. Both upper and lower wings are all in one piece. All tips are 1/16" diameter reed soaked and bent as the rudder was.

All ribs are of 1/32" balsa, except the ones where the struts fasten These are 1/16" thick. All the ribs in each wing are of the same curve. *(Continued on page 44)*

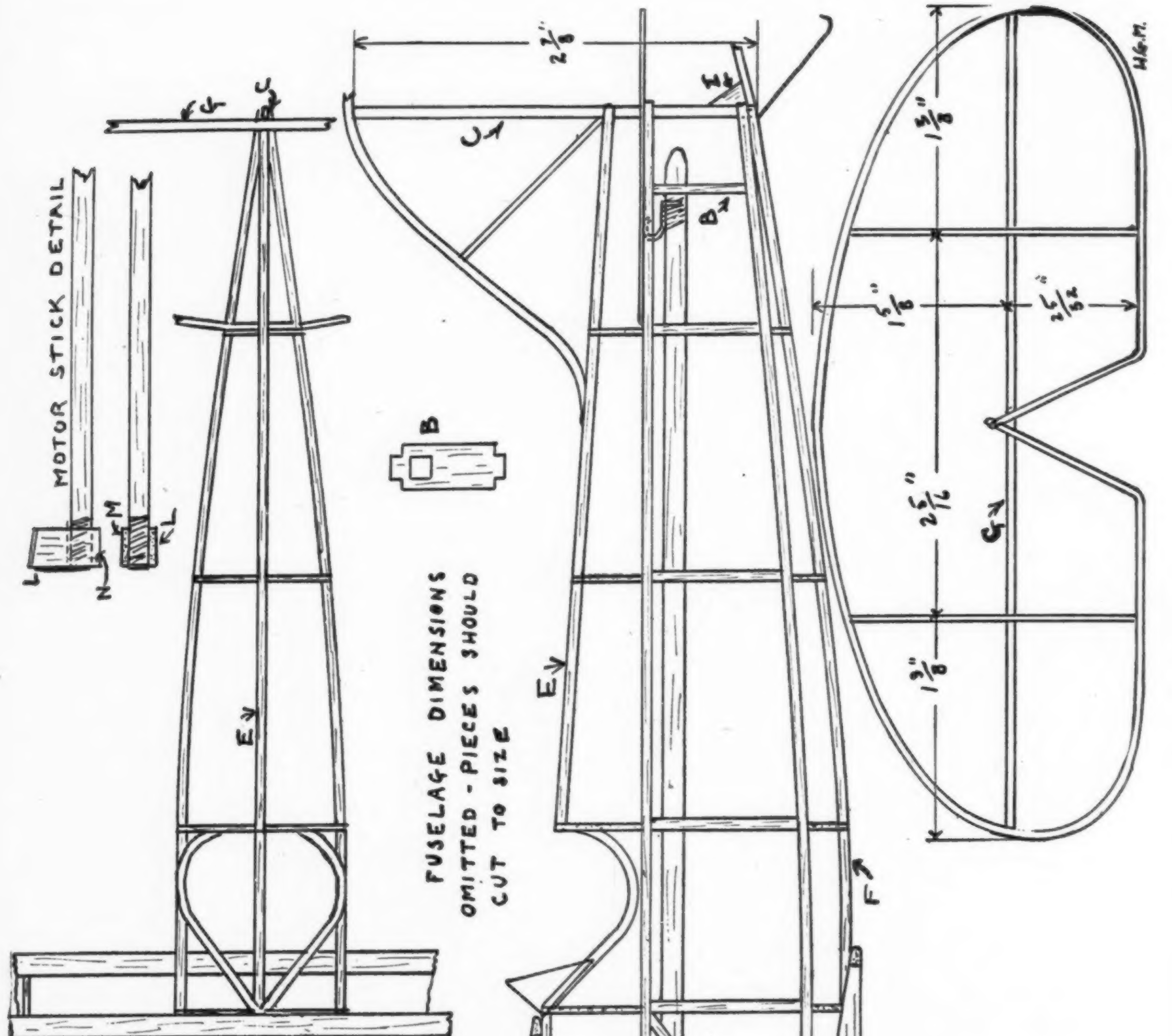


FIG I
FULL SCALE

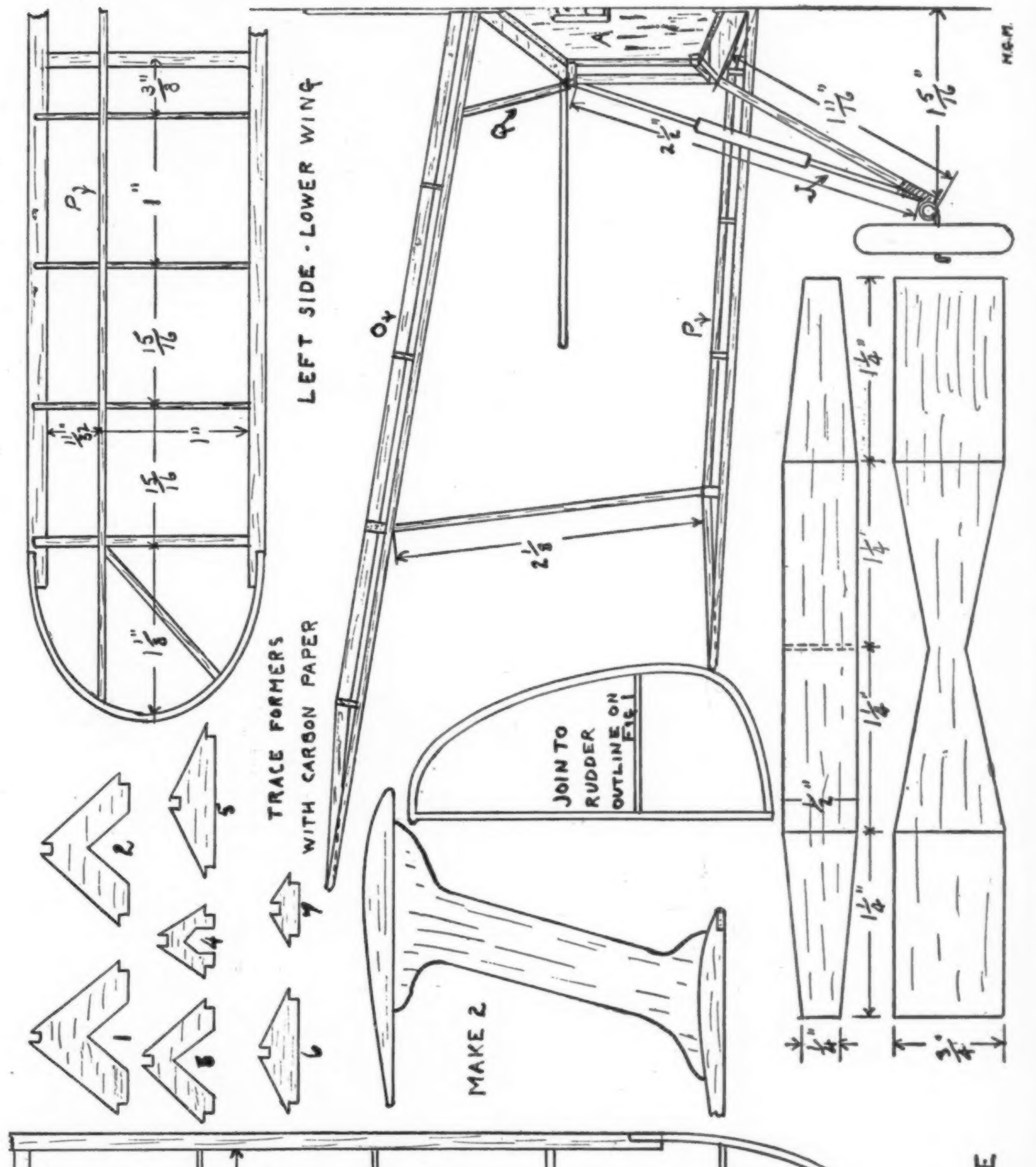


FIG 2 FULL SCALE

Kiffen Rockwell The Fantom Ace

Ace of the Lafayette Escadrille, and the First American to Conquer a Boche Flyer

By F. Conde Ott

A FLOCK OF WAR BIRDS PLANNING THE ATTACK
Left to right: Kiffen Rockwell, Capt. Thenault, William Thaw (hiding behind the Captain), Norman Prince, Lieut. de Laage, Elliot Cowdin, Bert Hall, Jim McConnell and Victor Chapman.

(This picture is reproduced from "One Man's War" by Bert Hall and John J. Niles, by courtesy of the publisher, Henry Holt and Company.)

ONLY the official record books deny that Kiffen Rockwell was an Ace. To the host of the war's most famous birdmen, Americans, Frenchmen and Englishmen, "Rock" rated with the finest that flew the trails of death that hung high over the shell torn soil of France.

The Germans knew him, too, and rated him just as high. For Rockwell was as dangerous as he was fair, as deadly as he was clean—and as cool in the turmoil of battle as he was warm in the friendship he spread on those with whom he lived and worked. Born in Asheville, N. C., Kiffen Rockwell was a true Southern gentleman. The traditions of his forefathers he carried on to noble fame and glory. Loved by his friends and respected by his enemies, his name and memory are a thousand times greater tribute than the bare, cold and exacting records we find in the closing chapter of the great war history.

Kiffen Rockwell happened to be in France when the war broke out. It was typical of his make-up that he should immediately seek service in what he liked to refer to as "the cause." His only opportunity was the French Foreign Legion with which he was soon affiliated. And so this son of proud Southern aristocracy, steeped in the traditions of a cultured life and reared in the lap of wealth and luxury, gave up all with but a moment's decision. That same decision meant living face to face with the polyglot crew that made up this widely heralded outfit; meant standing shoulder to shoulder in knee-deep muddy trenches with the misfits of the world who sought only adventure and cared not how or where they found it. They were fighting for the sake of a fight. Rockwell was fighting for a "cause."

We admire him for accepting his chosen station. We must respect him for seeking to improve it. This opportunity came when talk was nosed about that some influential Americans were attempting to organize a flying squadron. "Rock" was on his toes immediately. When the Lafayette Escadrille was finally established Kiffen Rockwell was one of its original seven sponsores and charter members.

A short period of training sufficed to inform the French high command that these Yankee boys "had the goods" and they soon found themselves at the front.

It was the spring of 1917. Verdun was the center of activity on the Western Front and a terrific struggle for the control of that strategic fortress was impending. Germany had concentrated her finest troops there, including the greatest and most efficient array of air forces the war had known up to that time. The Allies could hope to match the enemy in neither equipment nor numbers. But every available man was rushed into the breech and thither went the Lafayette Escadrille. A worthy baptism indeed.

Rockwell and his companions found themselves stationed at Luxeuil in the Vosges Mountains. It was on the fourth day after making camp here near the front that Rockwell, out on one of his trial flights which the newcomers were all ordered to make to get accustomed to conditions in the actual theater of war, met his first German ship. The conflict took place just back of Thann, very close to the battle line.

UNTRIED and inexperienced, Rockwell simply answered the urge to rush headlong into battle with the enemy craft, the thing he had been dreaming of since first the idea of an American air force had been suggested back in those filthy, muddy trenches months before. Without a moment's hesitation he turned his whizzing craft upon the German's trail, sighted his gun on the streaking Fokker and opened fire. To his complete amazement and disgust the German immediately headed toward the earth, a brownish mass in the mists below.

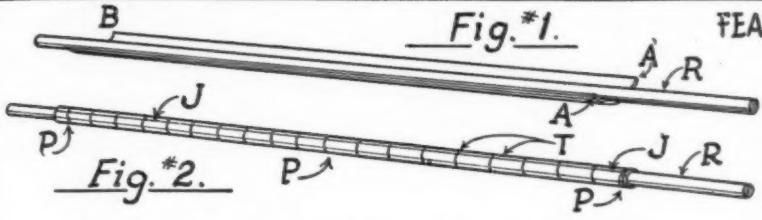
"Guess this fellow doesn't want to fight," thought Rockwell but even as the idea flashed through his mind he perceived why it was that this particular Boche had offered him no resistance. A thin wisp of blueish smoke started trailing the tail of the Fokker. Flames soon appeared as it gathered further momentum in its plunge, and "Rock" patted his gun affectionately as the falling foe struck the earth and annihilated itself completely in a terrific explosion.

Happy over his initial conquest, the grinning Kiffen with boy-like exuberance, rushed back to the airdrome to report his luck. His haste was needless for the good word had preceded him. Thus to Kiffen Rockwell went the honor of the first victory chalked up for the Lafayette Escadrille. When Rockwell went back to his ship to check his equipment and reload his gun he was amazed to find that only four bullets were missing. The very first shots that he had fired in "the cause" had brought him a cherished victory.

Other success soon came also to fellow members of the Lafayette Escadrille, and the Allied War Lords, with any lingering doubts they may still have entertained regarding the Yankees' true worth under fire now completely dispelled, ordered the Escadrille (*Continued on page* 38)

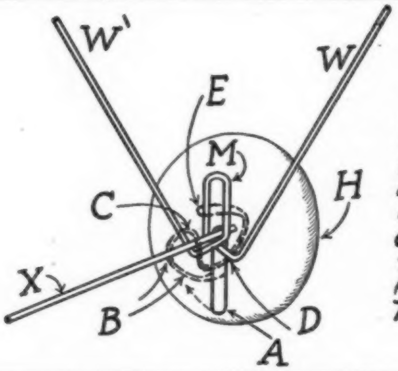
HELPFUL HINTS

FOR MODEL BUILDERS



FEATHERWEIGHT MOTORSTICK

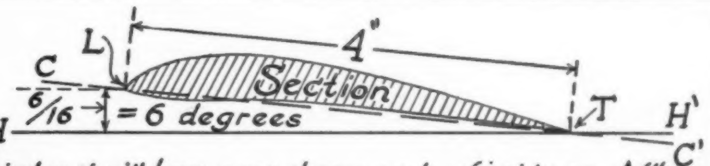
For contest models, may be made from a sheet of Balsa wood (AA'B) fig.#1. by rolling it around a metal Rod (R). First cut from a sheet of Balsa (1/64") thick (or less) a piece of desired length (A'B), width (AA') (Fig.#1) equal to 3-1/7 times the diameter of the Rod (R). Curl it around tightly, cementing Joint (J), Fig.#2. Then wind it with fine thread (T). Twist Rod while cement is drying to prevent adhesion. Pull out Rod when Joint has dried. Cement Balsa wood plugs inside of tube at Points (P).



SHOCK ABSORBING LANDING GEAR

The figure shows two wire struts (WW') of a landing gear, bent as shown, to form a loop (M) as an axle guide, and a crotch (D) below the loop. Axle (X) passes through the loop upon the end of which is placed a wheel (H). Loop a (3/4") rubber band (A) over the wheel, around the axle (X) and outside the wire loop (H), as shown by heavy line (A). Then pull loop (A) under and through crotch (D), up back at the axle at (B), over it at (C), down in front of it, back under crotch (D), up in front of axle between the wheel and wire landing gear, and loop the free end (E) of the rubber band over the wire loop (M). The dotted line shows the path of the rubber band.

HOW TO MEASURE DEGREES



In the figure, point (L) is raised (6/16) inches above the line (HH'). The point (T) on (HH') is (4) inches from (L). Then angle (HTL) is six degrees; one degree for each (1/16) inches rise. In other words, if the leading edge of a wing is raised (1/16) inches vertically and its chord is (4) inches, it will have a one degree angle of incidence. A (1/16) rise in (2) inches running produces a two degree angle.

SECRETS OF STABILITY

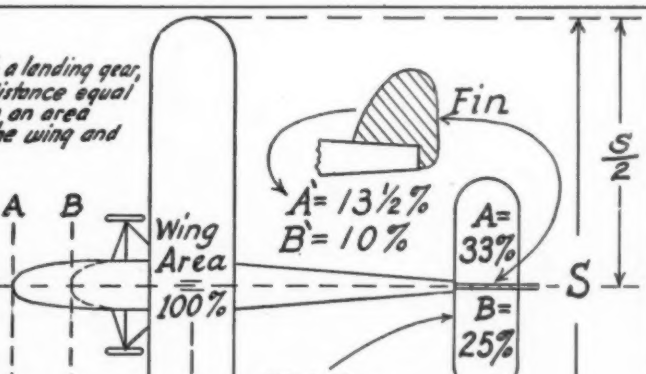
Case #1. In the case of monoplanes with a landing gear, where the body extends out ahead of the wing, a distance equal to (3/5) of distance (X), the stabilizer should have an area approximately equal to (33%) of the area of the wing and the fin about (13-1/2%) of the wing area.

Case #2. When body extends out only (2/5) of (X) from the wing center, the stabilizer area should be about (25%) of the wing area and the fin area about (10%).

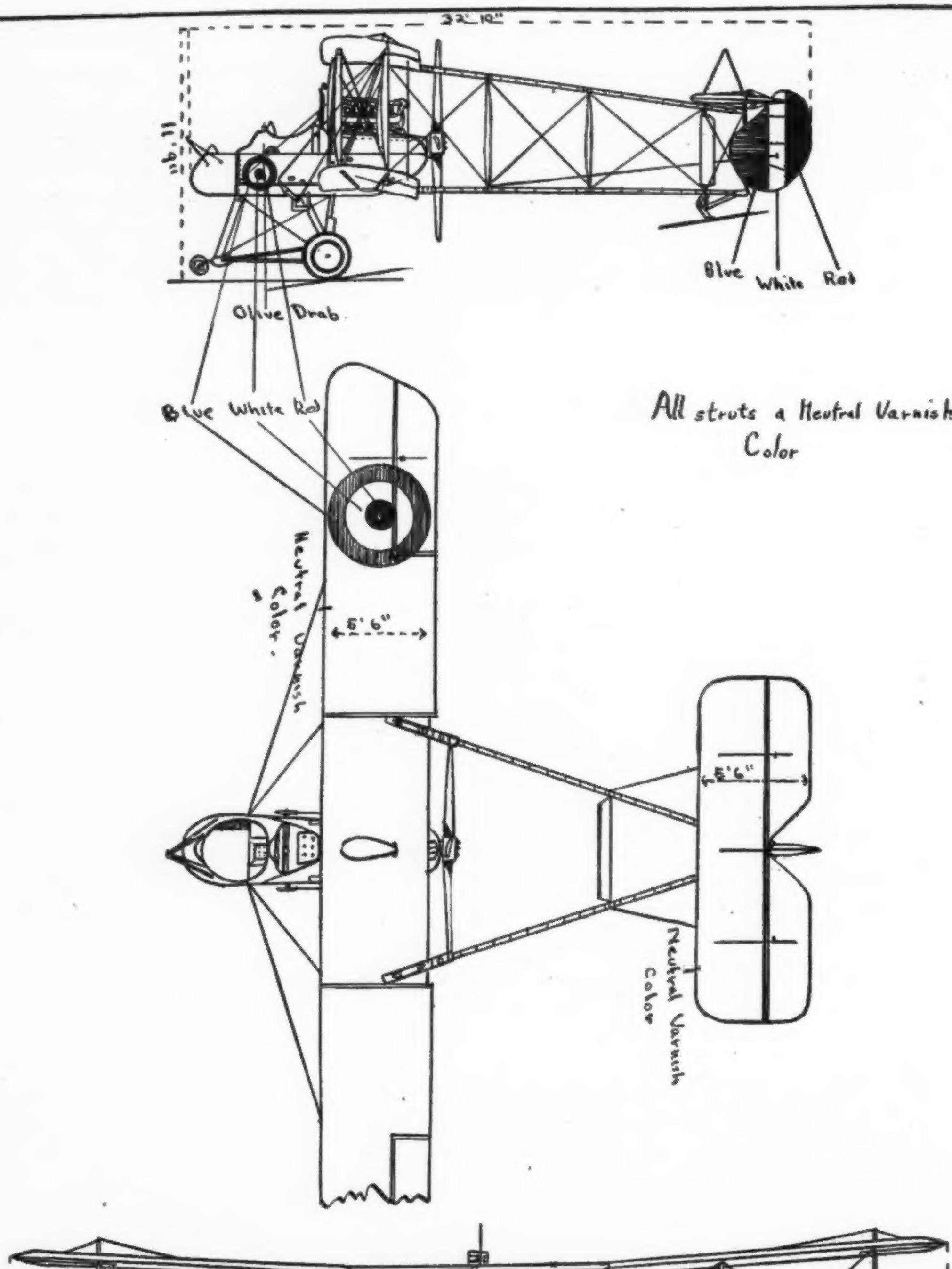
Case #3. In case #1, when the model has no landing gear, the stabilizer area should be (40%) and the fin area (15%) of the wing area.

Case #4 In case #2, when the model has no landing gear, the stabilizer area should be about (32%) and the area of the vertical fin about (13%) of the wing area.

Case #5. If your model is a biplane, the stabilizer area may be (5%) less, and the fin area (2%) less, in each of the preceding cases.



Distance (X) should be Not less than ½ Wing Span.



British F.E.2B 160 H.P. Beardmore Engine

Build and Fly This Model Helicopter

It Will Afford the Progressive Experimenter Hours of Pleasure in an Unusual Branch of Aviation

By Robert Loper
of Topeka, Kansas

The Curtiss-Bleecker Helicopter

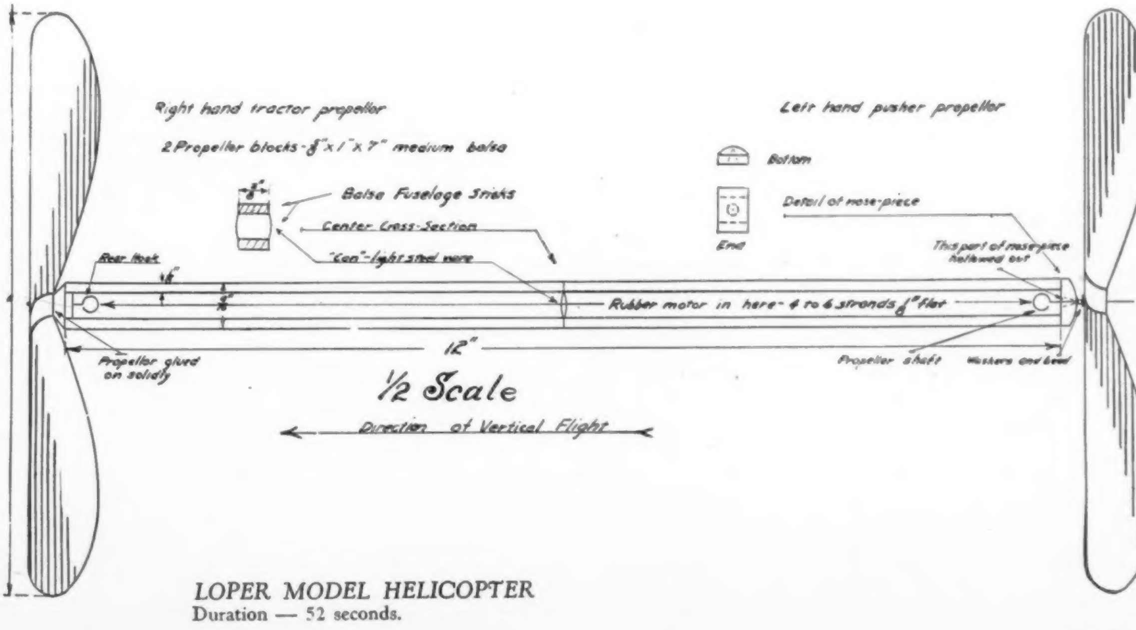
WHEN the model builders of my neighborhood tire of making duration models, they take great delight in "playing around" with little heliocopter and orthinopter models. Here is the design for a heliocopter that will delight you with its stirring, zooming flight.

The following materials are necessary: two balsa fuselage sticks, 1/8"x3/8"x12"; two balsa propeller blocks, 5/8"x1"x7"; two small pieces of balsa for end pieces; medium size steel wire for can, rear hook, and propeller shaft; small brass washers and a bead; any quick-drying cement; and about five feet of 1/8" flat rubber motor.

The two fuselage sticks should be sanded lightly to smooth off the rough edges and the end pieces fitted on. The rear piece is cut to 9/16"x3/8"x3/8" and the ends of the sticks are cemented onto one of the 9/16"x3/8" faces as shown in the drawing. Then the back is slanted away to fit the center portion of the tractor propeller, which will be cemented on later. The rear hook is next glued in place between the fuselage sticks. The nose piece is cut to the same size but one of the 9/16"x3/8" is rounded away smoothly. Then a hole for the propeller shaft is drilled and the inside of the nose hollowed out as shown in the drawing. A small brass washer is glued onto the outside to act as a bearing. The nose piece is now glued onto the fuselage, and the can, of light steel wire is slipped over the sticks and cemented into place.

The two propellers are next carved. Be sure to make one right-handed prop and one left-handed prop. The right-handed prop is cemented solidly to the rear fuselage piece. Be sure to set the propeller so that the blades will be at right angles to the frame. A hole for the shaft is drilled in the pusher prop, then the shaft, with the hook formed, is pushed through the nose piece, several washers and a bead are slipped on, and finally the propeller is slipped on and the end of the shaft bent over, pushed into the balsa and cemented.

If the model has been lightly constructed, four strands of rubber will suffice; if not, use five or six strands. The motor is assembled between the sticks and through the can and the model is ready to fly. Get out in an open place and give the motor a couple of hundred turns with a winder. Point the model upward (remember that the tractor prop, which turns with the fuselage should be on top) and let 'er go. A high, thrilling, vertical flight will be the result.



LOPER MODEL HELICOPTER
Duration — 52 seconds.

The Aerodynamic Design of the Model Plane

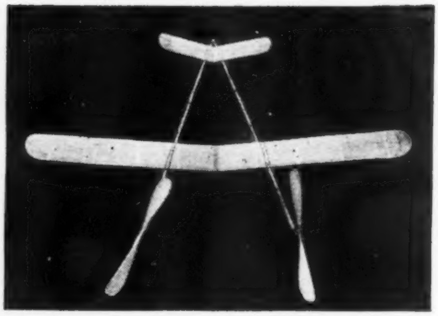
Secrets of Propeller Design That Will Help to Increase the Efficiency of Your Models

By Charles Hampson Grant

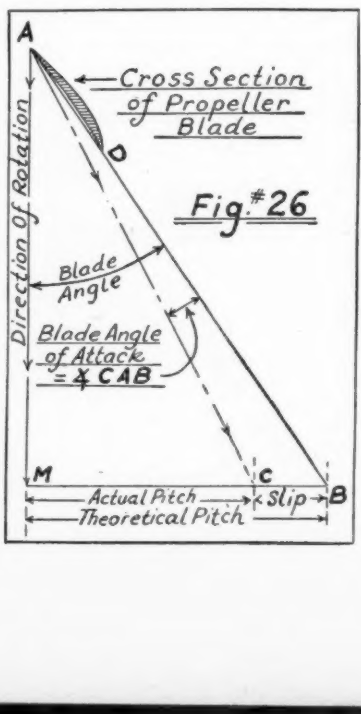
CHAPTER II ARTICLE 6

IN THE last two articles of this series we have taken great care to define and explain the use of the factors entering into the design of propellers. Of course, some of this may not have been as interesting as a story about Dick Turpin or some other lively individual. However, in order to arrive at the meat of our problem, we must consider these factors seriously, that is, diameter, pitch, blade angle and blade area. You see it is necessary to know exactly what we are working with if we are to design efficient models: something about our tools, so to speak. Now that we know the meaning of these factors, we can show you how you can use them in model designing. All of these things influence the shape of the propeller and the efficiency of its operation. It remains for us now to consider how we can use them to best advantage in various types of models we may choose to build.

The whole secret of successful model design is the proper proportioning of various parts, weights and aerodynamic actions relative to one another. We cannot put a propeller of just any size or shape on our plane and have the model fly properly. It must be very carefully proportioned in relation to the other parts and weights of the machine.



This twin pusher was designed according to the data given in this series of articles, which makes the usual trial flights and experiments unnecessary. Upon the first flight, it won the Keene-Manchester contest for its builder. The following week, without further trials, it won the Mulvihill Trophy and the New England Championship against two hundred other contestants at Boston, Mass.



Correct Diameter Values

THE first factor to consider in designing a propeller for our model is its diameter. This depends upon the span of the wing and the type of machine on which it is to be used.

Roughly, the propeller diameter should be from 1/3 to 1/2 the wing span. If it is a contest model you are designing, the larger the propeller—up to the limit just mentioned—the better it will suit the purposes of the model, except in the case of speed models.

The propeller diameter of scale models should be fairly small unless you do not care if the landing gear is unusually high in order to allow the propeller to properly clear the ground when resting on its wheels.

It is wise to make the propeller diameter as great as possible if "performance" is the object. However, if it is greater than 1/2 the wing span, it usually generates so much torque reaction on the model, due to the excessive amount of rubber required to turn it, that it creates a tendency to make the model bank steeply and turn in circles or to completely roll over sideways while in flight.

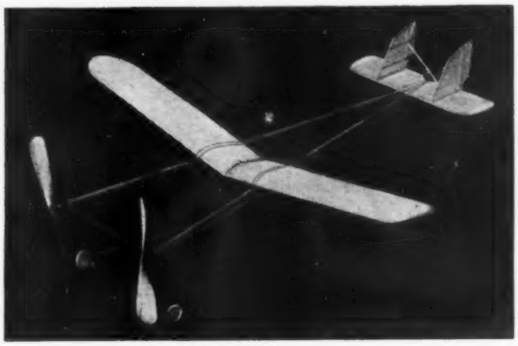
The diameter may be made less than 1/3 the span and yet have the model fly well. However, to cut it down below this figure reduces its efficiency and the length of flight proportionally. This often makes it necessary to have extremely wide blades on the propeller, in order that they will have enough blade area for efficient operation, without excessive torque.

Blade Angle

THE next consideration is The Blade Angle. How does this factor affect the action of the propeller? As we have explained previously, Figure No. 26, this angle is the angle formed by the surface (or chord) of the propeller blade and the plane of rotation. In a helical propeller, this angle is of different value at every point along the blade from the hub to the propeller blade tip. It is 90° at the hub and becomes small at each successive point taken as you proceed from hub to tip, Figure No. 28. It is smallest at this latter point. Whenever we speak of the propeller blade angle in a general way, we mean the angle of the blade measured at the tip. The best angle to give the blade depends on what we wish the model to do. The smaller the angle, the faster the "getaway" but shorter the distance the plane will fly.

Large blade angles will give greater distance and propeller duration. We measure this angle in terms of the block depth-width ratio. If we say that the blade angle is "one to two" we mean that the proportion of depth to width of block is (1) to (2) or, in other words, that the proportion of the pitch to the circumference of the blade tip circle is (1) to (2). In Figure No. 28,

the blade angle is (ES) to (ER). The limits of blade angle advisable are: 1 to $2\frac{1}{2}$ as a low limit, and 1 to $1\frac{1}{4}$ as a high limit. A good average for the usual model is (1) to (2). On the heavier R.O.G. models you should use the lower blade angles to insure a quick getaway and small torque reaction, while picking up flying speed before leaving the ground.



This model, proportioned to conform with the rules of design given here, established a national record for a twin tractor with 150 sq. in. of wing area, loaded one ounce per 50 sq. in., by flying more than one mile in a straight line and remaining in the air nearly four minutes, May 30th, 1930. It won third place against experts flying twin pushers with only half the wing loading

Pitch

MANY people confuse the blade angle of the propeller for the pitch. Remember the "pitch" is not an angle but the DISTANCE the propeller screws itself forward through the air in one revolution.

The proper amount of pitch to give a propeller varies. It depends upon the propeller diameter, the type of model you are designing and the flying performance you wish to obtain from it. A good rule to go by is to make the pitch $1\frac{1}{2}$ times the diameter for the average model. The low limit should be about $1\frac{1}{4}$ times the diameter, which ratio is used for the heavier R.O.G. models. The pitch for contest planes should be fairly high, about two times the diameter for duration ships and as high as $2\frac{1}{2}$ times the diameter for distance planes.

If you so desire, you can figure the Tip Blade Angle from this ratio of pitch to diameter, and thereby the proportion of the end of the block, or cross section. For instance, if the diameter of our propeller is 8 inches and the pitch is $12\frac{1}{2}$ inches, we have a pitch diameter ratio of $1\frac{1}{2}$ to 1, which is about right for the average model. The tip blade angle in this case is 1 to 2 or, as the pitch, $12\frac{1}{2}$ is to (π 8), or 25 inches, the length of the blade tip circle. The block depth should then be $\frac{1}{2}$ the block width, for

$$\frac{12.5}{25} = \frac{1}{2}$$

Blade Area

WE COME now to THE MOST IMPORTANT FEATURE IN REGARD TO DESIGNING A PROPELLER for your model. There is probably no other point which has so much effect upon your plane as this one, and strange to say it is one, the significance and principles of which, are least understood. This fact may make it difficult to comprehend. However, we can at least try to conquer the "demon."

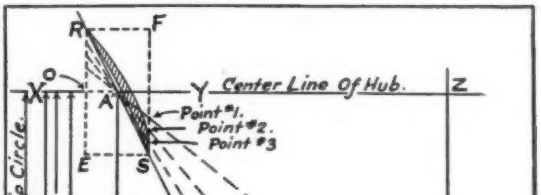


Fig. #28 Scale:- $\frac{1}{8}" = 1"$.

It is not sufficient that a propeller blade consist of a surface of ANY size or shape. The propeller area should be of different value for different designs of planes, and propeller diameters and pitches. Let us consider the shape first. In the first part of this chapter, Article No. 4, we showed you that a propeller blade is nothing more than aerofoil or wing, revolving through the air about an axis. It must therefore have a cambered or curved wing section (or blade section) just as a wing has a carefully worked out wing curve. This point regarding wing curves was discussed in the first chapter on "Wings."

A flat propeller blade causes a lot of "drag" or resistance compared to a curved blade, for the thrust obtained with a given power applied to the shaft. In fact, a flat blade will give twice as much resistance as a curved one, for the amount of thrust obtained. The ADDED RESISTANCE will also cause considerable TORQUE REACTION on the model and will tend to turn the model over sideways in an opposite direction to the rotation of the propeller. In this case the model usually flies in a circle to the left, if the propeller turns to the right.

Next we come to the question, What amount of area should we give to our propeller blades? THIS IS JUST AS IMPORTANT AS IT IS TO HAVE THE PROPER AMOUNT OF WING AREA.

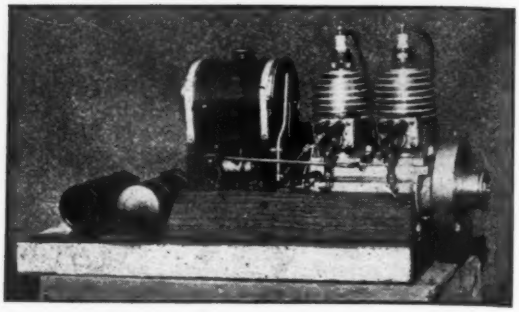
The explanation of how to determine the proper blade area is rather technical, and one that challenges the mathematical ability of most of our Model enthusiasts, in vain. Therefore in order that those who do not wish to go into this matter in great detail may have a fairly accurate rule to apply, the following simple, but approximate one is given:

The propeller Blade areas in the case of the average model should be about 10% of the wing area in order to insure a medium angle of climb. For a slight angle of climb it should be about 6%, and for a steep angle, 15%. This condition holds true for the average propeller, whose *pitch* is *one* and *one half* times the *diameter*. However, if you wish to determine the proper blade area for a propeller of *some other, Pitch-Diameter proportion or ratio*, then the Blade Area (a) should be the *Area needed for a Pitch-Diameter, ratio* of ($1\frac{1}{2}$) to (1) times.

$$\frac{P\sqrt{P}}{1.D\sqrt{1.5D}}$$

(*Continued on page* 40)

The trim little craft mounting its miniature engine, ready for a flight



Here is the little fellow complete, ready to turn out its two horsepower

Why Not a Gas Engine Model?

Here's a Successful One!

FORTY boys of a Junior High School of Pasadena, California, have been organized for months as an Aviation Club studying practical aeronautics under the leadership of their professor of Manual Arts.

Making all the parts in their own machine shop, after first figuring out the design and the dynamics, they have turned out the "instructional model" pictured here.

It is no *toy* but an exact duplicate in miniature of standard mail-planes, and with the installation of a two-cylinder, two horespower engine, is capable of making forty miles an hour. Fuel is carried, just as in ordinary planes, in little wing tanks, two pints of mixed gasoline and oil being the amount of fuel it carries to insure the desired cruising capacity at this speed. The entire plane weighs thirty pounds, is six feet long, and has a wing spread of ten feet, with a wing loading rated at two pounds per square foot and a horsepower loading of fifteen pounds per horsepower.

Of course such a ship is too small to carry a pilot; but at the public demonstration recently the controls were set for a straight flight, and the Club members followed its course in motor cars, ready to retrieve it as it landed—with small damage.

THE two-cylinder two horsepower motor with which it is equipped is the invention of their instructor, F. F. Latshaw; and small as this engine is it generates power and speed enough to turn the craft's 31-inch propeller at 3000 revolutions per minute. It has been patented under the name of the "California Pup," and is to be had either as a one or two cylinder engine. The larger size is an exact duplicate of the one horsepower, and doubles the amount of usefulness. The smaller weighs 4½ pounds, the two-cylinder one, ten pounds.

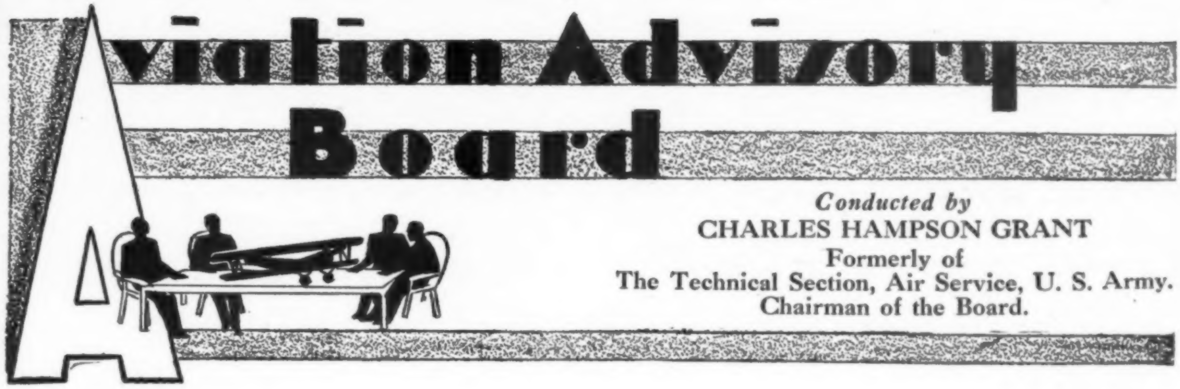
Both are exceedingly popular in Southern California and are put to a great variety of uses, propelling bicycles (at 35 miles per hour), children's wagons, drill presses, circular saws, water pumps, chairs of invalids, and even small automobiles.

The members of the Aviation Club have learned to make all the parts of the engine upon lathes, to assemble the parts, and to install them wherever wanted. They use either cast iron or aluminum alloy for the parts. In making the plane they did all the figuring necessary, made the parts, and then made and attached the engine, thus giving them an insight into the mechanism of aviation that could never be gained from books. Each lad will be a practical machinist before he is of real High School age.

Model Dirigible As A Weather Vane

CHESTER G. HUFF of Flint, Michigan, has built a very unique device in the form of a dirigible weather vane. The picture shows the finished model on the top of his garage. It is mounted on a ½" piece of water pipe and swings freely upon ball bearings. Its nose always points into the wind and indicates the direction from which it is blowing. This dirigible mounts three wind-propelled motors, one on either side above the rear of the cabin, and one in front of the lower fin. In action, it looks and performs like the real thing. It is 4½ feet long and has a diameter of 15". The whole ship is covered with muslin, painted with aluminum paint, except for the fins, cabin and motors, which are red. Black letters enhance its appearance. The expense of making the entire ship does not exceed the cost of the average model. Mr. Huff says that his device has created a great deal of interest in his neighborhood, and it is possible that model airplane builders will be interested in building this unique weather vane as a supplement to their regular activities in model building.

Mr. Huff, of Flint, Mich., and his weather vane mounted above his garage



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The Technical Section, Air Service, U. S. Army.
Chairman of the Board.

AS USUAL, this month our office has been flooded with many questions from our young readers. As a large proportion of the questions is on the subject of stability, we shall undertake to answer one or two of the most representatives ones.

Unquestionably, stability is one of the most difficult problems that the model builder has to solve and, in fact, it is even a great problem for the designer of large ships, as the data on this phase of airplane designing is not as plentiful as on the subject of efficiency and other features which may be worked out in the wind tunnel.

Here's a question from Charles Towle of Detroit Lakes, Minn. He asks: "Will you please tell me what makes some models stall when wound up tight even though they glide well, or, when set so they will not stall, dive on the glide? How can I remedy this?" The fundamental reason why the model acts in this manner is the difference in speed between gliding flight and power flight. Now, if we trace back the matter still further, we may ask, Why should the speed make a difference in flight? This is due to the fact that greater negative pressure on the tail surfaces (pressure on the top of the surface) is produced when flying at a high speed under power than when gliding. Suppose the stabilizer and the wings are set so they will glide beautifully, the stabilizer being at a considerable negative angle, then when the speed of the machine is increased in power flight, the air strikes the top of the stabilizer and pushes it down so that the machine noses up excessively. Suppose the wings are set correctly for a power flight, then under slow speed while gliding, the tail rises because of the fact that there is too little pressure on the stabilizer, and the machine "noses in." The remedy for this is simple. Raise the front of the stabilizer slightly, about 1/16", and then adjust the position of your wings for a proper glide. The machine also should make a power flight in which it does not stall so readily, perhaps not at all. However, this correction of the stabilizer may not be sufficient. If not, raise its front edge a little more. Follow this procedure until the right adjustment has been found which will allow the machine to both glide and fly properly with the same setting. You may be able to correct the trouble entirely by doing this. However, as a rule, when the negative angle of the stabilizer is decreased as suggested above, it is usually necessary to increase its AREA.

If you do this, as well as adjust the setting of the stabilizer, you should have one of the most remarkable flying planes that you have ever operated.

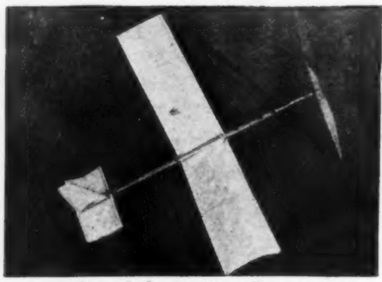
USUALLY, the area of the stablizer should be about 30 to 33 per cent of the area of the lifting or wing surfaces. If your wing is 24" x 4", its area is 96 sq. in. The area of your stabilizer, under these conditions, should be about 30 to 32 sq. in. These figures are for planes with a landing gear and wheels. If your plane is of the ordinary stick type, without a landing chassis, then your stabilizer area should be increased to 35 to 40 per cent of the wing area. This problem which we have just explained is one of the most important in model design, and is probably ignored more than any other, due to the desire of the average fellow to build a model to scale. You see, the tail surfaces of a scale model are about 50 to 100 per cent too small for fine flying results. These points are quite difficult for some of you model enthusiasts to work out as it requires long and patient experiment. In fact, it has taken about 12 years to determine the remedy for the trouble about which Charles Towle has questioned us.

BOB GRONDIE of Lakewood, Ohio, and Jack Russell of Cedar Rapids, Iowa, ask questions regarding the proper location of the wings and weighting of the model in order to have it balance while in (*Continued on page 45*)

The newest and smallest of the Navy's air fighting fleet, the F9C2.
Several of these little machines are nearing completion, and will be carried in the giant dirigible, the U.S.S. Akron.
Within this ship itself a considerable hangar has been built for the stowage and maintenance of planes. The gear for hooking on, hoisting, and releasing planes consists of a lattice work structure extending below the keel of the airship and carrying at its lower end a bar which engages with an overhead hook on the airplane.
The F9C was designed to be the smallest airplane which could be built around the compact Wright Whirlwind 420 h. p. motor, with pilot and required military equipment, since the size of an airplane is necessarily an important consideration in operating from a rigid airship.

The little plane is only 19 feet long, has a wing span of 25 feet 6 inches, has a top speed of approximately 180 m. p. h., and can climb 1,800 feet per minute.

«« IF YOU'RE LAZY SKIP THIS PAGE »»



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The Hawker Fury

(*Continued from page 13*)

the tail (stabilizer) struts are in Fig. 8. All these struts are very carefully streamlined to reduce resistance. (See "*assembly*".)

Propellers

The approximate size of a good sized prop block for the flying model is given in the List of Material. As nearly everyone has his "pet" method of carving one, no directions are given. On the original, the scale prop was used and flights of about 150 feet made. (See scale model details.)

Assembly

We now have the following parts ready to assemble:

- Complete fuselage, with landing gear.
- The center section.
- Four wing panels.
- Rudder—Fin combination.
- Elevator—Stabilizer combination.
- Assembled "N" struts.
- Tail struts.

The first thing is to prop up the tail into flight position. Then taking the wings support them on either side in the correct position. You may prefer to glue these on directly, or to use dress snaps as in the original, so that the wing may be taken off for easy transportation. In this case, you will have to use your ingenuity in fixing some system of detachable bracing.

The two cross wires shown in the front view of the center section are merely forced into the wood of the cowling and glued.

The flying wires in this plane are single, contrary to American practice, while both landing wires are fastened at one point at the top, i.e. the rear center section strut. From here they spread out and join the two bottom points of the "N" strut.

In putting on the stabilizer, glue the front spar directly to the top of bulkhead "K," and also cement struts "A" in place, but do not glue down the rear spar. The dotted outline of this arrangement is shown in Fig. 2. The two rear struts, "B," are glued together at their lower ends, but *not* to the fuselage. You will now see that while the stabilizer is firmly in place, the rear of it can be moved up and down slightly. Leave it like this until after you have test flown the model, holding it steady by the little blocks shown. In this manner you can make up for any little eccentricities. After you get the correct adjustment, you can touch these places with cement.

After the wings have been aligned, the "N" struts are put in place. In putting in the wiring be careful not to warp anything.

You will notice that the plane has no motor stick, but if you have followed instructions, it will be plenty strong enough. To get in the rubber, put a long hooked wire through the plane and use this to draw it through. Three or four loops of ⅛" flat should be sufficient to fly the ship, depending on your prop, and the weight of the plane.

Flying:

The model should first be balanced so that the center of gravity comes approximately at the place marked C.G. in Fig. 7. To get it there you may have to place ballast inside the nose. Be sure that it is as far forward as it is possible to get it;—this means less weight.

At any rate, the model ready for flying

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Kiffen Rockwell

(Continued from page 28)

right up into the thickest of the going. Bar-le-duc was their new airdrome and France's beloved Cigognes, most famous of all flying squadrons, their new neighbors.

By this time the entire Lafayette Escadrille was flying Nieuports, more maneuverable than the justly famed German Fokkers but still not so sturdily built nor as well armed. For the Allied airmen this meant that what they lacked in equipment, they must make up in the quality of their flying tactics. The Germans further had the advantage of superiority in numbers of aircraft, but these handicaps Rockwell and his buddies cheerfully accepted.

SHORTLY after their arrival at Bar-le-duc, on the morning of May 24th, the Escadrille was ordered up before dawn. Scores of German ships were already sweeping across the sky when the Americans found themselves aloft in the first faint light of the new day. It so happened that Rockwell and Thaw, another of the original seven who had organized the Escadrille, became a bit separated from the group and so they stuck together to pool fortunes, as it were.

This had been found to be to good advantage, especially in "dog fights." One fellow could protect the other man's tail from surprise attacks at this vulnerable spot. But this time Rockwell and his companion found themselves above the Germans and immediately started the fray on their own account. Each singled out a victim and Thaw soon had a victory to his credit as a Fokker was seen to fall, careening crazily into the morning mists that rose from the battle scarred ground below. In the meantime, "Rock" was having his troubles with an elusive Aviatic that just wouldn't take a bullet in a vital spot. In return, however, the German himself could not inflict any serious damage and when he turned to draw off, Rockwell let him go to race to Thaw's assistance.

As the latter was dispatching the lone Fokker, five companion planes of the German had come upon him and thus poor Thaw was now battling for his life against odds. Even as Rockwell rushed to his aid, Thaw's ship was beginning to wobble from the fierce fusillades of steel the Germans were pouring into her. Two of the enemy ships had a dead bead on him from the side and another two were getting at him from underneath.

As he arrived on the scene and took the situation in at a glance, "Rock" realized that his best bet was to turn the attention of the latter two ships, so he headed into them at top speed, working his machine gun madly as he sped along. The Boches immediately circled away with the American in hot pursuit.

In the meantime, poor Thaw having taken a terrible punishment from all sides, was swiftly falling away apparently out of control. Believing that he was done for, the Germans who were responsible for the deed shifted their attack to Rockwell who was now throwing a devastating fire into the Fokkers he had chased from Thaw's tail. He did not know that Thaw was out of action until he felt himself being stung with lead from behind and side. Quickly realizing that he was completely boxed and done for unless he acted at top speed, he put his ship into a loop, slipping away from the Boches' withering shots and putting himself into an attacking position.

As he came out of the loop he found himself tearing head on into one of the Fokkers. Both ships were racing directly at each other with machine guns going full blast. "Rock" could see the fabric ripping away from the German ship and knew his aim was true but the enemy pilot had his gun playing directly on the American, too, and suddenly Kiffen was stunned for a moment by a strange smash directly in front of him. He was blinded by it, and when he came to he felt sharp pains all over his face; blood was streaming into his eyes and over his goggles.

A stray shot had smashed the tiny windshield in front of his cockpit and sprayed his face with bits of flying glass. Finding it almost impossible to see, he turned and headed for home as best he could, dodging the continuing fire of the Germans haphazardly until they finally gave up the chase well over his own lines. Despite his own hurts, his first thought upon landing was an inquiry for Thaw.

He was told that the latter had succeeded in making a landing behind the French lines from where he was taken to a hospital to allow a shattered elbow to mend. The officers told Rockwell also that the German plane he was battling with when he was blinded by the shattered glass was seen to fall and crash a wreck behind its own lines and that he had already been credited with the victory. Disabled as he was, Rockwell had downed an enemy plane without even knowing it.

THE shattered windshield had done him no great or permanent harm, but "Rock" was nevertheless under medical supervision for a time. But on June 17th a newcomer to the Escadrille, Clyde Balsley, of El Paso, Texas, was to make his first flight across the lines. It would be just a flying lark and Rockwell, despite his condition, decided to join the group that was to accompany the fledgeling.

As the quartet of Americans emerged from a dense cloud bank at about 13,000 feet they found themselves in an area swarming with German ships. One group of about fifteen immediately took it upon themselves to surround the luckless four Yankees. The German squadron included a number of Aviatics, ships that had just about the same air speed as the Nieuports but still carried double armament. The added rear gun made them nasty competitors.

Unwilling to turn tail despite the odds, the Americans met the attack head on and in a moment each man found himself absorbed with the delicate task of defending his life against three or four determined foes.

In the midst of it all, young Balsley, on this his first flight, was knocked helpless and barely succeeded in reaching the airport to save his tattering machine from cracking up. Three of the Boche Aviatics, bent upon making Balsley's destruction complete, followed in his wake and poured round after round of withering shots at him.

Rockwell, sensing the helpless condition

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Whats and What Nots

(*Continued from page* 7)

hacksaw blade held on it while it is turning. The grain may run any way, but lengthwise is best.

Where a stronger wood is needed, or where a piece must be of a certain strength, but of smaller cross section than would be possible with balsa, pine or spruce may be used. An example of such use would be a spruce motor stick.

Reed

Reed is a rather porous material of circular cross section. It bends very easily and if soaked in water, then held to a certain shape and dried, it will hold its shape indefinitely. It comes in most any length, and in diameter from 1/16" up. It can be split fairly well, is smooth and shiny and needs no sandpapering. Reed is used mainly for curved outlines such as wing tips, tail surface outlines and cockpit outlines. Being rather weak, it is not suitable for use on landing gears and the like.

Bamboo

Bamboo is a heavy, close grained material, which is used extensively in models where strength is required with small cross section. Landing gears are usually made of bamboo as it is flexible enough to absorb the shocks of bad landings and yet is very strong. Bamboo usually comes in strips of 12 to 15 inches long and ¼" x ⅛" in cross section. This is called "split" bamboo. It is also obtainable split into pieces 1/16" square and smaller, and is called "shredded" bamboo. As we all know, bamboo grows in straight stalks, which are broken up into sections by slightly enlarged nodes or joints. The term "joint" is usually used, however, to designate the straight portion between two nodes. It is possible to cut through a node if you need a piece longer than 15 inches or so, but it is not very satisfactory, as the grain is irregular and the material weaker.

Only the outer 1/16 inch of any bamboo piece should be used, because the inside material is weak. A good rule is to always have the shiny part as one of the wider sides. That is, if the piece is 1/8" x 1/16" in cross section, the shiny part should be one of the 1/8" sides.

If you wish to split bamboo, proceed as follows: stick your knife point through the piece in the middle, lengthwise; then at intervals of an inch or two, repeat the operation, going toward both ends from the center. The pieces may now be separated and trimmed to correct size. If you try to start at one end and split the piece to the other, the split will always taper off to the edge.

Bamboo must be heated to bend it. A candle flame or a small alcohol lamp is used for this purpose. If possible, always have the shiny side away from the flame while bending. Do not hold the piece in the flame, but rather on the side of it and when making any but a very sharp bend, keep the piece moving back and forth so the whole bend will be heated evenly. If you do not do this, there will be a series of rather sharp curves. Great care must be exercised to keep the piece from charring as this dries it out and makes it useless. When bending a piece of small cross section, it is best to keep it moistened in order to prevent charring. In fact, small pieces burn so quickly that it is better to bend a thicker piece and cut it down to size.

When making pieces which require exact duplicates, such as wing tips, make both pieces in one and split into the required number. Any number of pieces can be made alike this way.

Bamboo is too hard to sandpaper well, but may be cut with a sharp knife or small plane, the latter being ideal to smooth down small pieces.

Wire

Most all wire in modern models is music wire, which comes in various sizes, such as No. 8, No. 12, etc. This is very tough and strong for its size and usually has a bright steely finish. Its greatest use is as propeller shafts, wheel bearings, and clips of all sorts, and it excels anything else for such parts because of its great springiness. It may be cut with high grade cutters, but it is best to break it by bending back and forth while held in pliers or vise, especially if your cutters are not of the best.

There is no great trick to wire bending, but there is a knack to it which must be learned by practice and which cannot be described very well. The only advice that can be given is to make sure your piece is straight without kinks or bends before you start your shaping. If you have much bending to do, there are various special shapes of pliers which may be used, but these are not really necessary.

Wing Coverings

Most model planes are covered with paper of various grades, depending on the model's finished weight. The lightweight models are covered with superfine tissue. This is very light with a slightly glazed finish and may be procured in many colors as well as white. For heavier models, that

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Aerodynamic Design

(Continued from page 33)

It may be written as a simple formula as follows:

$$\text{Blade area, } a = K \frac{AP}{1.5D} \frac{\sqrt{P}}{\sqrt{1.5D}}$$

In the formula, (A) equals the wing area in square inches, (P) the new pitch, (D) the new diameter of the propeller in inches, and (a) the required area of the propeller blades in square inches. The letter (K) is a constant, which varies as follows for various angles of climb:

For horizontal flight . . $K = 0.035$.
For a slight angle of climb, $K = 0.06$.
For a medium angle of climb, $K = 0.10$.
For a high angle of climb, $K = 0.15$

These values of (K) should be inserted in the formula in place of (K), according to the Angle of Climb that you may desire. You see there is a practical use for algebra, geometry and other forms of torture after all.

The Reason Why

For the benefit of the reader who may have a more inquisitive nature, it is necessary to explain why all of this is true so now suppose we unleash our minds and examine our problem carefully, analyzing it step by step.

To begin with, the sole purpose of the propeller is to pull the model through the air at a sufficient rate of speed or, in other words, to overcome the resistance of the air striking the machine when it is in flight, which backward resistance the propeller overcomes or balances by pulling forward.

It is quite obvious that the greater is the resistance at any definite flying speed, the more area our propeller blades must have, just as we should have more wing area if our wing should have a greater weight to lift. If our propeller blade area is *too small*, it will not grip the air but spin around, merely churning it without moving forward the proper distance in every revolution.

So we may correctly say that *for any given model speed or propeller pitch and diameter, our propeller blade area must be proportional to the resistance of the plane in flight.* If the resistance of the model increases due to an increase in speed, *the area of the blades need not be greater* for they turn faster in proportion to the model's forward speed and the added thrust of the propeller in this case, due to the faster rotation, overcomes the added resistance of the model.

However, if we increase the wing area to—say four times as much as originally—the weight of the model remaining the same, then it will fly about ½ as fast and the propeller will also have to reduce its rotation by one-half in order that it cooperates, in screwing itself through the air with the lower plane speed.

Here the resistance of the model is practically the same, the weight being the same, but the speed is one-half as much. The propeller thrust, however, is only one-quarter of its former value as its rotational speed has been reduced to ½ its former speed. Note—The formula $L = K A c V^2$, showing the relation between speed and lift (or thrust) was given in the first chapter.

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AIR—WAYS

(Continued from page 24)

Model Engineers of Dayton, Ohio, of some pioneer work in steam model construction by William Utzinger of Dayton, Ohio, who is a member of the Dayton Chapter of this organization. Picture No. 15 shows Utzinger's steam model which is believed to be one of the few successful steam models ever built in this country since Langley's experiments. The Goodyear Zeppelin engineers co-operated with him in helping to plan a boiler for the model which would be light and yet strong enough to withstand the enormous steam pressure. The ship has a span of 65 inches and an over-all length of 36 inches. The fuselage section at the wing is 5½ x 6 inches. A 13 inch propeller is used which turns about 1,500 r.p.m., driven by a three-cylinder motor, using steam pressure of 50 lbs. to the square inch. The boiler is made of sheet aluminum and is enclosed in a fire-proofed compartment in the fuselage. The amount of fuel used has been computed so accurately that it will be used up at exactly the same time as the last drop of water has evaporated from the boiler. This obviously prevents any damage to the latter. Details of the power unit are being kept secret until a later date. The model itself is a high wing monoplane, cabin type, weighing 5 oz. without the boiler, and 8 oz. ready to fly.

Picture No. 16 shows Utzinger with his three foot model of the Dornier DO-X on which all of the 12 propellers generate thrust and which has demonstrated its ability to fly for short distances.

The wing spread is 36 inches, chord 5⅛ inches, overall length 22 inches, height 7 inches. The 12 propellers are operated by four strands of ⅛ inch rubber, each propeller being connected to the shaft by belts. If any of the readers wish to affiliate themselves with the national organization of the N. A. M. E., they may do so by getting in touch with D. F. Chase, National Director, P. O. Box 1041, Dayton, Ohio. The national president is Major Jimmie Doolittle and the vice-presidents include Colonel "Bishop of Canada," Capt. A. Roy Brown, Lieut. Alford Williams, and others of equal prominence.

In picture No. 20 we see the advanced members and directors of the Leavitt Model Club which is sponsored by the Model Research Laboratory of Stratford, Conn. The Leavitt Club has been very active during the past winter. The picture shows a few of the models built for a recent contest.

In picture No. 21 Frank Filo, champion of the Bridgeport clubs, is demonstrating his Curtiss Fledgeling to Edward Kovac. The S.E.5 shown in picture No. 22 was built by Vernon H. Sanborn and flies with pilot, as shown. This model was developed at the Model Research Laboratory at Stratford.

Eastern States Indoor Championship

It is just recently that we have been able to get the results of the Eastern States Indoor Championship Model Meet sponsored by the New York Graphic. This was held at the 165 Regiment Armory on Lexington Avenue. Some of the finest model builders in the East were present and staged their usual performance of remarkable model flying. Large crowds hampered the

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Whats and What Nots

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is from 4 to 5 ounces up, a stronger grade of paper is used. A paper-like material called gold beaters' skin is sometimes used, but the framework must be very strong or it will warp when you tighten it up. This skin is very shiny and exceedingly tough and is quite light in weight.

In covering any model, great care should be taken because no matter how fine your wood work is, a poor covering job will ruin the appearance of the model. Do a good job in the first place, because it is almost impossible to remove the paper from a model to recover it, especially if it has been painted or doped.

When covering any part of a model where the curves are rather complex, as is usually the case near the nose, use many small pieces rather than several larger ones. Paper, you know, will only bend one way at a time. To prove this, take a sheet of stiff paper, about 5" x 10", and bend it the long way into a half round form. Then bend it crosswise at the middle and you will find the original bend straightens out there. If you force both bends at once you will have wrinkles. Just this same action takes place on models if you bend the paper two ways and causes wrinkles. Another cause of wrinkles is a weak point in the frame. If your wing trailing edge is too small, the paper will pull it in and wrinkles will form in the corners. Weak fuselage longerons cause the same trouble.

The best way to tighten up any of these materials is by spraying with plain water, which can be done easily with a bulb type household atomizer. A spray of the lung power type may also be used. The water should be put on lightly, that is, just enough to wet the paper well and leave no excess drops on the surface. The drying may be hastened by heating slightly.

The paper is stuck to the frame with banana oil, a colorless, rather thick liquid, which dries very quickly. It is best to buy this from model supply houses as drug stores usually carry a grade too thin for model use. This liquid may also be used for doping or coating the paper of a model, but the writer prefers plain water. To thin banana oil, another chemical called acetone is used. This may be bought at any drug store.

Other materials used for covering are silk and aluminum foil. The former must be used on a strong frame and made air-tight with dope. The foil is only a couple of thousandths of an inch thick and cannot be tightened in any way, so must be put on very carefully. Both silk and foil may be fastened on with model cement.

Cement

Model makers almost universally use quick drying glue or cement, which is colorless, waterproof, somewhat flexible when dry, and very tough. Chemically, it is very much like celluloid, and may be had in cans or tubes. If for any reason you wish to remove or unstick parts you may do so by applying a fresh coat over the dried portion. This will soften it sufficiently so that the pieces may be separated.

As noted above, banana oil is used mostly for doping paper and for fastening it to frames, but it may also be used for doping silk.

Desert Wings

(Continued from page 9)

pickets out first," I answered with a composure I was far from feeling.

Of the congratulations, praise, etc., that followed, it doesn't matter. If Dick hadn't stood up in his seat at that moment, the spray might not have blown over me, I wouldn't have acted as I did, and well . . . he did stand up.

We did not leave the ground again that day. Motors and cockpits were covered up and we huddled together, backs to the wind, waiting for it to die down.

Cairo, when we arrived the following morning meant merely a bath, a change and more work. The delay in arriving had used up time we would otherwise have spent in recreation.

The return flight was the last Dick ever took with me, he was transferred shortly after, but if that boy didn't have a jinx sitting on his tail, I have never seen a better imitation.

About one hour after crossing the Dead Sea—the country had become desert again—the holding down bolt on one of the starboard cylinders sheared, the motor started vibrating violently, and the water poured out in a steady stream.

"Down, Dick," I indicated once more, pulling back the throttles. For the next few minutes the air was filled with the noise of screaming wires, falling from a shrill falsetto to a resentful hum as I eased the wheel back. When he pulled out after two flying wires had gone, we glided for about five miles before our wheels touched the ground.

Switches off, aerial mast up, radio communication to establish, disabled motor to attend to, our minds and hands were too busy during the next few minutes to notice much else. I was driving ground pegs for the guy ropes when I chanced to look up. In a large circle round the plane sat a group of 20 to 30 motionless Arabs. Their presence was all the stranger as none of us seemed to have noticed their coming.

I left the work on hand and went up to them. "Yalla, Imshi," I ordered using such words as I knew for "move on." Not an answer, not a reaction, not even a sign did I get that my words had been understood. A sudden misgiving came over me. Where were their women? Arabs on a friendly mission will usually be accompanied by their womenfolk. This party had none. "Establish communication with the base as soon as you can," I told the radio operator. "Here is our position," I handed it to him, "report that we have a disabled motor and are surrounded by Arabs, tribe unknown." The cranking of the hand generator announced the sending of the message. A reply was not long. Three armored cars at an oasis a hundred miles away had been ordered to come to my assistance and to stand by me till the following morning when a new motor was being flown out to me by plane.

The day wore on. We had finished all we could do on the disabled motor and no sign of the armored cars arriving or of the Arabs departing.

"Let's get in the cabin and talk the matter over," I suggested. A discussion followed in which various opinions were advanced. Suddenly a shout from Dick caused us all to look out. The sitting

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Aerodynamic Design

(Continued from page 40)

Reducing the speed ½, decreases the lift ¼, therefore, in order to have the propeller deliver four times as much thrust at this given reduced speed, *it must have four times as much area.*

We have now come to the point that we have been working to reach. At this reduced speed we have to enlarge the wing area by *four* and the propeller area by *four.* They have, therefore, proportionately the same area at this lower speed as in the first case.

So, we may write as an axiom that "*the propeller area should be proportional to the wing area for any given propeller diameter, or pitch, and given performance capacity of the model.*"

"It is very fine to quote this," you may say, "but why is this true and how are we to tell exactly how much area to allow in our blades in the first place?" Let us examine our problem. (Note—*In the following explanations and examples, we will assume that the propeller diameter is 8 inches and that the pitch is 12½ inches. The necessary blade area under these conditions should be a definite proportion of the wing area. How this relationship changes for other values of diameter and pitch will be shown as we proceed.*)

We have shown that the thrust of the *propeller* must be equal to the resistance of the model while in flight, in order to keep it flying. Do we know anything about this resistance, however? We know that a good average lift to drag ratio of a model in normal horizontal flight is about ten. That is to say, the resistance of the machine is 1/10 the lift on the wings. (Not taking into account the drag of the propeller.)

If this is the case then the lift or pull forward on the propeller blades is 1/10 the lift on the wings. If, therefore, the propeller blades are traveling through the air at the same speed as the wings and at the same angle of attack, approximately, the area of the blades should be 1/10 the wing area. (The lift or thrust of the propeller being 1/10 the lift of the wing.) However, the propeller as a whole, moves forward with the model at the wing speed and the blades move around or *rotate laterally as well as move forward.* So their speed is greater and made up of a combination of forward and rotational velocity. The point of average effect of each blade as it rotates is 2/3 of the blade length out from the hub toward the blade tip. If our propeller should be of 8 inch diameter it would then be 2/3 of four inches, or 2-2/3 inches out from the hub. Thus the circular path of rotation of this point is 5-1/3 inches in diameter. Its length is (3.1416) x 5-1/3 = 16¾ inches. The pitch of the propeller we will take to be 12½ inches. So in one rotation the propeller moves forward 12½ inches. The actual path that it travels is the hypothenuse of the long side of a right triangle, Fig. No. 26, whose side (AM) is 16¾" long and whose side (MB) is 12½" long. The path of travel (AB) is equal then in length to

$$\sqrt{(AM)^2 + (MB)^2} \text{ or}$$

$$\sqrt{(16.75)^2 + (12.5)^2} = 20.9 \text{ inches}$$

So we see from this that while the wing moves forward in one propeller revolution, 12½", the blade actually travels about 21 inches through the air. As 21 = (5/3) 12½, or in other words, as 21 is (5/3) of 12½, we see that the propeller blades move 2/3 faster than the wing.

We have already shown that, if the propeller is to pull with a force of 1/10 the lift on the wing, its area should be 1/10 the wing area, provided the speed of the wing and the blades are equal. The formula for lift is $L = K\ A\ V^2$. (Where L = lift, or thrust, K = 1; A = area of surfaces in consideration, and (V) = speed.)

We may write the values for the wing into the formula thus: 100% = K 100% $(1)^2 = (1)$ assuming (V) equal to (one) in this case. IF the propeller speed were also "one" and the thrust 1/10 the wing lift, we write it as follows: $(0.1) = A\ (1)^2$, or A = (0.1) of wing area.

However, the blade speed is 5/3 of the wing speed, or 5/3 x 1. Then, the formula gives us the proper amount of blade area under these conditions as follows:

$$(0.1 = A\ (5/3)^2 \text{ or } A = \frac{0.1}{2.75}$$

A = (0.0359) of the wing area. This means that the propeller blade area in this case, in view of its greater speed over that of the wing, should be (3.59) per cent of the wing area, or practically 3.6/100 of it. If the wing area happened to be 100 square inches in area, then the propeller blade area should be (3.60) square inches.

This blade area is very small and the proper amount *merely to propel the plane along in a horizontal path without any climb.* If we are designing our machine to have climbing ability this value for the blade area is not sufficient, for it must then not only overcome the air resistance of the machine but also overcome the backward pull of the component of gravity. In this case, it is the same with your plane as it is when an automobile has to climb a hill. The propeller must pull the model up an "air grade."

Next month we will find out how the propeller area should change with the angle of climb that is desired for your model. Save your breath for "this one."

Magnus Effect

(Continued from page 5)

lacious to refer to his discovery as the *Magnus Theory*, for the professor was able to demonstrate the application of his principle long before any explanation of it could be found. In fact, it was twenty years after his initial announcement and three years after his death before physics had produced a sound solution to the mystery of its strange force.) Professor Magnus, discoverer also of the *green salt of magnus* —$N_4\ H_{12}\ Pt_2\ Cl_4$—was essentially a chemist, and, so, after offering the facts of his discovery to the world, he left the problem of its practical application to others.

Professor Magnus' discovery was as simple to demonstrate as it was then difficult to understand. In brief, as it was interpreted after his death, it was learned that, if a current of air is directed against a smoothly polished revolving cylinder, whose circumferential speed is greater than that of the air current, a force is directed against one side of the cylinder. The explanation, too, is simple. The layer of air

next to the cylinder revolves with the cylinder, for the elemental reason that the friction between this stratum of air and the cylinder is greater than the friction of air molecules against each other. This rapid whirling of air currents with the movement of the cylinder produces a partial vacuum on one side of the cylinder and compresses the air on the opposite side. This variance of air pressure, which will be practically constant if all factors remain constant, is the explanation of the *Magnus Effect*, which, as will be readily seen, exerts a force on the cylinder directly toward the area of rarefied air and directly away from the opposite field of highly compressed air.

FEW DETAILS are available of the new rotor airplanes that are said to be almost ready for marketing, but, whatever their details, their rotors must resemble, in principle, those employed by Flettner on the Baden-Baden. Three types of rotor planes have been built within the last several years; and these three, always allowing for minor variations, seem to exhaust the possibilities. The seaplane, referred to above, which proved unmanageable at its initial test, employed two rotors in lieu of the orthodox wings, the span of these rotors being somewhat less than the average wing span of the conventional monoplane. The rudder and tail assembly were of common design.

A second type of rotor plane employs wings of ordinary design, though shortened to about one-half the average length. In this design, outrigged rotors, somewhat shorter than the wings, are employed as extensions to the wings. The third proposed plan for a rotor airplane combines the usual wings and rotors, the rotors being set in the forward edges of the wings.

The proponents of rotor airplanes, embodying the *Magnus Effect*, make many claims for this type of plane. Primarily, they contend that a rotor plane will afford approximately ten times the lift of a conventional airplane of the same size and weight. They claim further that, with this increased lift, a rotor plane will carry many times the load of a wing plane of similar size. They do not promise vertical ascent or descent, for the pull of the propeller precludes this, but they do maintain that a rotor plane will make possible a more abrupt landing or take-off than an auto-gyro. And they argue further their plane will require a smaller landing field than the usual airplane for the additional reason that, as it will maintain elevation at an extremely low speed, it can, also, be landed with very little forward momentum.

WITH a rotor plane, however, having ten times the lift of a wing plane and, so, ten times the sensitivity to changes in air currents, it seems extremely unlikely that it would be possible to effect a rapid enough change in the circumferential speed of one rotor to counteract the unbalancing effect of quickly changing, uneven air currents. Some rotor planes have used ailerons to aid in balancing, but the difficulty of sufficiently fast adjustment has not been eliminated by them. It is interesting to note in this connection that Mr. Guest, referred to above, is of the opinion that his rotor plane will need no ailerons and that he may even be able to dispense with the elevators.

Mr. Guest's rotors are different from any others that have yet been shown, and it is in the several differences that he hopes to attain results that have been previously thought impossible. His rotors, which, of course, are substituted for wings, are unlike the smooth, long rotors of the Flettner rotor ship. These rotors taper from the maximum diameter, which is slightly off center, to the ends. Slots, one inch deep, one inch wide, and six inches long, are distributed regularly over the surface. Two rotors will be substituted for each of the usual front wings. The larger will have a maximum diameter of forty-two inches, and the smaller will be twenty-two inches; both are seven feet, ten and one-half inches long.

The rotors will be geared in pairs, and each pair will be separately controlled, so that the speed of either pair can be increased or decreased at will within the range of from 900 to 1,800 revolutions per minute. It is the belief of the inventor that the original design of his rotors will eliminate the danger of sideslips, and that their gyroscopic action will insure a perfect equilibrium in the air.

The difficulty of gliding a stalled rotor plane to earth has long been one of the staunchest arguments against this type of airplane. Whether the Guest rotor plane, with the broad sustaining surfaces of its two pairs of twin rotors, has overcome this difficulty is a speculative problem that cannot be definitely answered without a practical test. There is, however, the significant argument of the doubters to consider, for they point to the fact the sustaining surfaces of any rotor plane must be convex, indicating a far greater air "leakage" than must be contended with when gliding on the concave surfaces of the conventional wing.

However, the latest development of this principle gives promise of practical results and application to commercial aviation. The mechanical set-up of this application of the Magnus Principle can be briefly described as follows: In general, it is composed of a normal airplane wing section with a rotor of a peculiar design located just above the leading edge. The wing section itself is modified in order that the rotor may operate efficiently against the air stream attacking the wing. The upper wing surface immediately to the rear of the leading edge is concave instead of convex. In this concavity the rotor is located and is free to spin in the air stream. The diagram shows a sketch of the arrangement. The peculiar thing about this device is the rotor itself, for instead of being a cylinder rotor, as most of its predecessors have been, it is made up of two half cylinders, staggered so that the concave surface of one cylinder is presented to the air stream while the convex surface of the other faces forward. The whole combination is free to spin. This is clearly illustrated in the diagram. As one might suspect, in a design of this kind, the air strikes the hollow half cylinder, driving it backward, while the convex is forced forward against the air stream. The arrows indicate the direction in which the rotor revolves.

In the case of this type of rotor located on the wing as described, great resistance to the air stream which flows over the

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Hawker Fury

(*Continued from page 37*)

should not weigh any more than two ounces, complete with ballast and movable controls.

While not really intended for an outdoor model, it can be flown there on a fairly calm day.

To test it give the rubber about one hundred turns and let the ship loose on the ground, do not shove it. It should take off in about fifteen feet. Stalling or driving can be taken care of in the conventional manner, and also with the adjustable stabilizer.

As a Scale Model

The same general instructions apply as for the flying model, as all of the measurements are the same. However, the wings would look far better if an extra rib were installed between each of those given in the flying model, or if they were made of solid balsa. The same applies to the tail surfaces.

The best advice to those who wish to put many small details on a ship is to get as many pictures as possible.

An authentic and neat paint job goes a long way on a scale model also.

The Color Scheme is as follows:

Silver—Wings, empenage, fuselage, sides of wheels.

Black—All struts, landing gear, exhaust ports, tail skid.

Cocades—Red center, white circle, and outer circle blue. About 3½" in diameter, placed approximately 1½" in from the tips. Also small ones 1½" diameter on sides of fuselage behind cockpit.

Stripes on rudder, blue at the hinge, then white, and red at the trailing edge.

Suggestions for Gaining Endurance

The easiest way of gaining endurance in a model is by lightening it. This can be done to a considerable extent by leaving off all the movable controls, and not having the wings detachable. Most of the fairing strips on the fuselage could be dispensed with also, and the remaining ones made of balsa instead of bamboo. A propeller of larger pitch and area will increase the flying time considerably. A propeller that will fly the plane efficiently may be cut from a block of balsa, 9 x 1¼ x ⅞ inches.

Flying Fool

(*Continued from page 25*)

The lower wing has a ⅛" x 1/16" strip in the center which holds the wing to the fuselage. The center rib of the upper wing is glued directly to the top of the fuselage. All leading and trailing edges are ⅛" x 1/16" balsa. Spar O on the top wing is 1/16" x 3/32" and spar P on the lower is 1/16" square.

All parts of both wings except O and P are glued in place. When dry the spars are cracked at the center and the tips raised to get the correct dihedral. Glue is then spread over the cracks and the spars O and P glued in place. When dry cover both wings.

The wings may now be glued in their proper places using pins to hold them and lining them up very carefully. The angle of incidence is O° for both wings.

The small struts Q brace the top wing, while the lower wing is glued to the rear landing gear strut on each side to brace it.

The interplane struts are cut from 3/32" balsa and fitted in place.

This finishes the model except for decorations. The original has green wings, flippers and rudder, and white stabilizer and fin. The fuselage nose back to the top wing is silver and the rest natural white. All struts are silver, as is the propeller. Two black motor blocks with short exhaust stacks were added. The model weighs a bit less than three-tenths of an ounce with wheel landing gear.

If you do the covering as the work progresses, you will find the job much easier than to do it after the ship is all assembled. Of course, all covering should be sprayed lightly with water to tighten it.

As a final word, do your work carefully and you will have a model which will, due to its perfect performance, probably become one of your favorites.

Magnus Effect

(*Continued from page 43*)

upper surface is generated. This fact causes the stream to be thrown upward abruptly, curving over the top of the wing at a considerable distance from the upper surface and joining the air stream from the lower surface at the rear. Thus, the normal vacuum which occurs above the wing is increased three to four times in magnitude. Obviously, this creates enormous increase in the lift. Under these conditions, burbling, or boiling of the air over the upper wing surface, might occur if it were not for the fact that a certain amount of the air stream which strikes the concave side of the rotor passes through underneath the rotor, close to the upper surface of the wing. Thus, the effect of a wing slot is simulated. It is said that tests of this device have produced remarkable results which, however, the inventors prefer to keep secret until they have completed their engineering research. This idea will possibly provide much food for thought among our model builders; in fact, I suggest that some of my young experimenters apply it to their models. Some flying models embodying this idea might give remarkable results and provide an experiment of unusual interest for those who are looking for something unique, and certainly off the beaten track.

Aviators, men who earn their living in every-day flying, apparently give little thought to the experiments of the men who are trying to build them safer, faster, generally better planes. I asked one of Uncle Sam's airmail pilots whether he knew anything about the application of the *Magnus Effect* in rotor planes. We were having lunch at a drug store fountain. He looked up from his sandwich, frowning.

"Come again," he suggested.

I repeated the question.

"Oh—the *Magnus Theory!* Yeah, I heard about it."

"What do you think about it?" I insisted. "Will it work?"

He put down the sandwich and looked up at me, smiling tolerantly. "Listen, Buddy; I ain't got time to bother my head about these here theories one way or the other. If they decide to put it on my 'crate,' I'll figure it's all right, and I'll fly it; and if they don't that's all right with me, too."

"But," I persisted, "you must have some opinion about it."

He put down the sandwich again, reluctantly I thought. He shook his head slowly; evidently he felt sorry for me.

"When you got to make Boston and back twice a day for sixty dollars a week, you get just about enough time in between to sleep." There was a note of finality in his tone. I asked no more.

I tried the Holmes Airport on Long Island, just across the Queensboro Bridge. The three men I met showed no interest in the *Magnus Effect;* two of them, as a matter of fact, had never heard of it.

I made one more attempt. The last man I questioned is one of the best-known flyers alive. His reputation with the American public is, perhaps, second only to that of Charles A. Lindbergh. His successful flight to Europe is only one of a long list of notable achievements that will go down to posterity in the annals of aviation.

"The *Magnus Effect?*" he counterqueried to my leading question.

He seemed lost in thought. I waited a considerable time for his answer.

"I'd rather not be quoted," he said finally.

"But, surely, you must have some opinion," I urged him.

"Between you and me," he replied, and there was a distinct air of confidence in both his tone and manner, "I'd rather not be quoted.

"I never heard of it!"

Desert Wings

(Continued from page 41)

figures had disappeared as silently as they had come. It amazed and worried me.

"A guard all night," I decided as the shadows lengthened and no sign came of the armored cars. The uneasiness that sat on the faces of all of us was apparent as we sat round our evening meal. The silence of the desert, broken only by the distant howl of the jackal, has to be lived to be understood.

Soon we were talking in whispers. Somebody tried a joke but I doubt if half of us heard it. At eight o'clock I rose.

"Right, you fellows, I'll stay around till midnight, then you can take over, Dick, till four and pass it on to Harkins. Keep the rifles loaded and leave them in the rack at the door."

Then commenced a wearisome vigil. The moon had risen.

Suddenly: "Sahib!" Out of the stillness of the night came the word in a sibilant whisper. "Sahib!" I spun round on my heels in a flash. An Arab about 6 paces away was approaching. In one hand was a bowl of sorts, in the other he held one of those curved, pointed, double bladed knives without which no desert Arab would be completely dressed.

I do not think it was entirely nervousness on my part that kept me inactive. Eighteen hours working and flying in the open had left my mind somehow without the energy to function alertly. The man was between me and the rifle. As he advanced a couple of paces I retreated. "Dick!" The word was never spoken, for even as I moistened my lips to make the sound, the man set the bowl on the ground and turned without another word.

The night ended then and there for me. The gift of a bowl of sheep's milk proved the Arabs to be friendly, but we did not relax guard, nevertheless, though the rest of the night proved uneventful.

The relief plane arrived next morning with a spare motor. It took us exactly four hours before we had it installed and running. The armored cars we never saw at all.

"Dick Tompson," I said after our return, "as a pilot you may be all right, but as a steady diet you're bad for my blood pressure."

Advisory Board

(Continued from page 36)

flight. Bob Grondie asks: "How can you make an airplane balance correctly, using no weights, and without spoiling the appearance of it by moving the wings backward or forward?"

Answer: It cannot be done, unless you are able to make the various parts of the airplane of such weight that when they are in place the model balances perfectly. No movement of the tail surfaces will correct this trouble without causing other more serious difficulties.

Jack Russell asks where to place the wings on the body of the ship so that it will balance properly. The location of it may be determined in the following manner: First, balance the model on the edge of a ruler: fuselage complete with the motor, propeller, chassis and tail surfaces attached. Move the ruler to various trial positions until the machine balances in a horizontal position. Mark the point where the ruler touches the body and draw a vertical line upward from this point.

Now attach a thread to any part of the upper surface of the fuselage but not more than 1 in. forward or backward of the line which has just been drawn. Suspend the model from the thread and continue the line of the thread down, marking where this line intersects the first line that was drawn from the bottom of the fuselage upward. The point of intersection of the two lines is the center of gravity of the airplane. Place the wings on the machine so that the leading edge is a distance, ahead of this point, equal to one-third of the wing chord or wing depth (from leading to trailing edge).

If your machine is a biplane, the wings should be placed so that a line connecting the upper and lower leading edge passes in front of the point a distance equal to one-third the average chord of the upper and lower wings. Any slight lack of balance may be readily corrected by an adjustment of the tail surfaces.

Fastest Pursuit Plane

Another question that we have in our bag of tricks is: "What is the fastest pursuit plane in the United States?" This is a rather debatable question, as the actual high speeds of all the Army ships are kept in strict secrecy. As far as it is known, the Boeing P.12E is the fastest one in the United States at the present time.

"Salted" Valves

"Are valves with salt-filled stems any better than the solid types?" Yes, they are unquestionably better. They have less tendency to heat up, burn and warp.

Kiffen Rockwell

(Continued from page 38)

of the youth, plunged recklessly after the heavily armed Aviatics and succeeded in driving them off. He was later loudly acclaimed for this brave deed for it was discovered upon landing that "Rock" was entirely out of ammunition and had done most of his chasing purely on bluff. An heroic faker, if ever there was one.

Conservative estimates, provided by the men who fought and lived with Rockwell, were that in July of '16 he had fought at least forty engagements in the smoky skies and during the next hot month of August an equal number of Germans faced his withering attack. Many fell, no doubt, before the cool and resourceful pilot, but only Rockwell knew the actual number that succumbed to his deadly fire and "Rock" never pressed for confirmation. To him the actual victories definitely helped "the cause"; confirmations merely glorified it.

So when orders came to the Lafayette Escadrille in September to vacate the airdrome at Bar-le-duc, Rockwell's splendid record of hazardous and unflinching service through the long summer was embellished with only four official victories. They found themselves back at Leuxeuil. Brand new and improved Nieuports were being provided for the entire Escadrille, which was to act as a protecting arm for a group of gigantic bombers that the French had concentrated there. The Mauser Munition Works at Obendorf, which were supplying much of the German army with its deadly war materials, was to be the objective of the carefully planned air raid.

Realizing that the Germans had this vital spot heavily guarded both with anti-aircraft and a splendid flotilla of ships of their own, the Americans overlooked no detail in putting their own new advanced Nieuports into tip-top shape.

SUCH concentration of Allied air forces in one spot soon aroused German suspicions and they, too, began mustering their strength across the lines. A close watch was set up.

Oblivious of the danger, Rockwell and his pal Lufberry decided to go up on the morning of September 23rd and give their new machines a good check-up in the air. Together these two had earned more victories, engaged in more combats and shown more cool daring and unexcelled skill than any others in the entire Escadrille. Come what may, they were always ready. Side by side their droning Nieuports took them skyward.

At 18,000 feet Lufberry spied a Fokker through a break in the clouds. Waving a cheery adieu to "Rock," he dove in on it. Rockwell returned the greeting, clouds closed in upon him and he was alone.

Nosing down through a cloudbank, he came again into bright sunshine at about 15,000 feet. A lone German scout was buzzing lazily across No Man's Land, heading into Allied territory. "Rock" immediately gave chase and adroitly maneuvered so that he could drop down on the German with the sun at his back. Thus it would be doubly difficult for the Boche to see him.

As soon as the German felt the hail of steel descending upon his ship, he slipped out of the deadly line of fire, twisted around into an attacking position himself and turned his own guns loose on Rockwell. The latter was coming on so fast that a head-on collision seemed imminent to the hundreds who watched enthralled in the trenches below. The German was seen to slip sideways for a moment, as the ships passed pouring their death-dealing potions into each other. Wings barely grazed, so close were the steely-nerved antagonists battling each other. A mighty shout had arisen from the throats of a thousand spell-bound Poilus as the German wavered. But the next instant they were gasping as the Boche righted himself and sped away. Rockwell's plane, at first starting in slow descent, gradually gained headway and started to plunge toward the ground. At the very last moment it seemed to flatten out but crash it did, nevertheless, not a hundred yards behind the French trenches.

Willing hands were available in an instant to assist the stricken pilot—but Kiffen Rockwell needed no more help. His chest and neck were riddled with bullets. A chance blast of shots from the unknown German's gun had found the most vulnerable mark in a difficult target and cost the Allies one of their greatest and most valuable fliers. So Kiffen Rockwell, who had lived like an ace, died like an ace, yet never attained the title. But he had also lived for "the cause" and fought for "the cause." When he died for "the cause," he passed a hero, beloved and mourned by many friends. Thus, the inspiration that he left made his passing not in vain.

AIR—WAYS

(Continued from page 40)

contestants to a considerable degree through their over-enthusiasm. It is possibly due to this fact that several models reverted to the scrap pile and a few others were unable to attain a maximum performance. No records were broken. The results, as reported by Jerome Kittel, one of the contestants and winners, are as follows:

RESULTS BABY R.O.G.

Junior Class	
Julius Wile	4:38
Jerome Kittel	3:55
Senior Class	
Henry Runkel	4:04
John Zaic	3:56

RESULTS DURATION

Junior Class	
Welcome Bender	7:40
Jerome Kittel	6:30
Senior Class	
Joe Kovel	8:13
John Young	8:03

RESULTS COMMERCIAL

John Zaic	4:04
H. Orzechowski	3:42

RESULTS GLIDER

August Ruggeri	:15 8/10
John Zaic	:12

Picture No. 24 shows a group of winners.

Australia on the Air

We have a little surprise for our readers this month. Ivor Freshman, secretary of the Model Flying Club of Australia at Sidney, has been kind enough to write and send me information and pictures of their activities in that far-off part of the world. Picture No. 25 shows a group of our Aus-

tralian fellow aviation enthusiasts, starting off a group of models. This picture is certainly unique in so much as all four machines are in flight. Mr. Freshman is shown at the extreme left of the picture, broadcasting the events in this contest over Station QUE of Sidney. Picture No. 26 shows the group of contestants which were entered in the meet on this occasion. Will not some of our readers or clubs write to Mr. Freshman and establish an exchange of ideas? Such contact will help to advance aviation science and the spirit of sportsmanship.

Bamberger Aero Club

One of the members of the Bamberger Aero Club has provided us with a very unusual picture. This is not surprising for these young men are pioneers and leaders in the model airplane field. This picture, No. 27, shows Stanley Congdon of Glen Ridge, N. J., with his 13 foot glider. It weighs 5½ pounds and has made 75 flights at altitudes of 200 to 2,000 feet. There is only one thing that Congdon must be careful of in launching this ship. If he should have writer's cramp and hold on too long he would possibly get a free ride for which he would not be prepared.

During the Boys Week Model Airplane Contest, May 7, 1932, the N. J. State R. O.G. record was broken! Martin Radoff broke the state R.O.G. record of 4.04 with a flight of 4.53 minutes. Martin is a beginner and the record breaking flight got him the first prize he ever won. It is only fair to state that his brother, Emanuel, who won the 1931 telegraphic meet and made the previous record in 1930, designed the plane.

Announcement

The Seaford Chamber of Commerce, Inc., wishes to announce the Model Airplane Tournament to be held at Seaford, L. I., on Saturday, July 2nd, 1932. It will start at 10.30 a. m. sharp. The events will be as follows:

Junior and Senior 1—Outdoor Twin Pusher.

Junior and Senior 2—Outdoor Commercial Flying Model.

Junior and Senior 3—Outdoor Tractor.

Junior and Senior 4—Outdoor Speed Model (any type).

Junior and Senior 5—Outdoor Replica Flying Model.

Junior and Senior 6—Scale Model Nonflying.

All model sportsmen who wish to learn the particulars regulating this contest should get in touch with the Tournament Committee, Seaford Chamber of Commerce, Inc., Seaford, L. I., N. Y.

Scientific Model Airplane Contest

This contest, to be held on July 23, promises to be one of the most outstanding events of its kind. It is open to everybody and no registration whatever is required. Contestants will simply bring their planes to the field for entering. There are to be two classes, Junior and Senior.

Fourteen valuable prizes will be given to successful winners. The events in each class are to be as follows:

Commercial: The hollow cross-section area to be no less than four square inches. Twin pusher: No rules. Glider: Hand launched, for endurance, all-balsa construc-

(*Continued on page 48*)

A New Hobby

Model Builders in Best Position to Make Money Collecting Air-Mail Stamps

By M. Sage

Except for professional pilots and plane owners, no one is so well equipped to make large and easy profits from Air Mail stamp collecting as the Model Builder. Junior Aviation enthusiasts know that many of the famous first flights over new air routes are largely financed by the mail carried. Stamp collectors (Philatelists) value very highly the historic stamps and envelopes which have ridden through the air on the opening trip of a new air route and the first trips, mail "pay load" is always large.

Often special issues of stamps are issued for new flights and the profits made by those "in on the ground floor" at such times are truly startling. The number of stamps in each of these special issues is limited and as the demand for them upon the successful completion of the flight increases, their value goes up by leaps and bounds. Here are a few instances:

A cancelled stamp of the 1919 Newfoundland Flight (Hawker) cost 3c and is now worth $1,500.

The 1927 De Pinedo stamps costing 60c at time of flight are now worth $2,000.

The 1930 Columbia stamp worth 50c two years ago at U. S. Post Offices is now worth $600.

Of course you remember the two flights I will mention below. Look out for stamps carried on these flights; save them and collect a profit when stamp collectors not familiar with aviation find they need the items for their catalogue.

Paraguay Zeppelin Stamps (3 peso and 4 peso, with picture of Zeppelin) carried on Pan-American flight in 1931.

Freidrechshaffen to Reykyavia, Iceland flight.

There is no person better informed on the up to the minute news of aviation, new flights, etc., than the young aviation enthusiast. With very small expenditure you model builders can use your knowledge of aviation news to buy at low cost valuable stamps for new Air Mail flights. It's easy. Mail your letter addressed to yourself on the plane making the opening trip, and hold the returned stamp for its increase in value.

Get yourself an album, costing 69c at any stamp store, and begin with this new and profitable hobby today. Next month I will give you more inside dope on this great sport.

To help you in getting started MODEL AIRPLANE NEWS has persuaded the Broadway Stamp Co., Inc., to give readers who send 2c for postage two interesting free booklets, "The Fiery Throne" and "How to Start a Stamp Collection." Address your request for the booklet to Mr. M. Sage, c/o MODEL AIRPLANE NEWS, 570 7th Ave., New York City.

AIR—WAYS

(*Continued from page 47*)

tion. Novice event: Any size, kind, shape of plane.

The contest will be held at Branch Brook Park, Newark, between the hours of 9 a. m. and 2 p. m., and will probably attract hundreds of boys from all parts of New York, New Jersey, Connecticut and Pennsylvania. It is sponsored by the Scientific Model Airplane Co. of Newark, N. J.

Kansas City Will Hold Model Airplane Meet

A Model Airplane Meet sponsored by the Junior Aeronautics Club and supervised by the Aeronautics Committee of the Kansas City Chamber of Commerce was held in Kansas City on June 12th.

The winner of this meet will be flown to Dayton, Ohio, by Mr. Brock, Continuity Ace, to represent Kansas City in the national miniature airplane contest.

Correspondents Wanted

The following young men have requested that we print their names so that other fellows interested in aviation might write to them. Cannot some of you fellows, who haven't got the palsy in your right hand, get busy and exchange a few ideas with these model builders?

Edward Gage and Leonard Keown, Route 6, Box 13, Fayetteville, Arkansas.

Robert Ogden, 837 East 61st Street, Chicago, Illinois. This young man wants foreign correspondents.

Ralph J. Stanke, 3238, North Sacramento Ave., North Center Station, Chicago, Ill. Stanke writes that he is 19 years old and has been ill with tuberculosis for the last three years. He finds the study of model building very interesting. Will not some of you fellows "come across" and help to make the hours of this young fellow a little more pleasant, by writing him concerning your activities?

George Kinsman, of 28 Russell Street, Hammond, Indiana, would like to have some fellows write to him who would be interested in exchanging some old "Flight" magazines (English) for some "Sky Pilots," "Aero Digests," or "Flying Aces" magazines. Perhaps some of you fellows can accommodate him.

Frank Simmons, 43 Hall Street, Chagrin Falls, Ohio.

N. Siegel, 3840 North Newland Avenue, Chicago, Ill.

Irving Rosenstein, 876 East 24th Street, Paterson, N. J.

Manley Mills, 1309 South Main Street, Anderson, South Carolina.

Robert Mattison, 614 - 6th Street, Brookings, South Dakota.

Norman Turner, 2135 Lexington Avenue, North Merchantville, N. J.

M. Pelenaude, 4633 Sherbrooke Street West, Montreal, Quebec, Canada.

Eugene Shepard, Canyon, Texas.

Robert Ogden, 837 East 61st Street, Chicago, Ill.